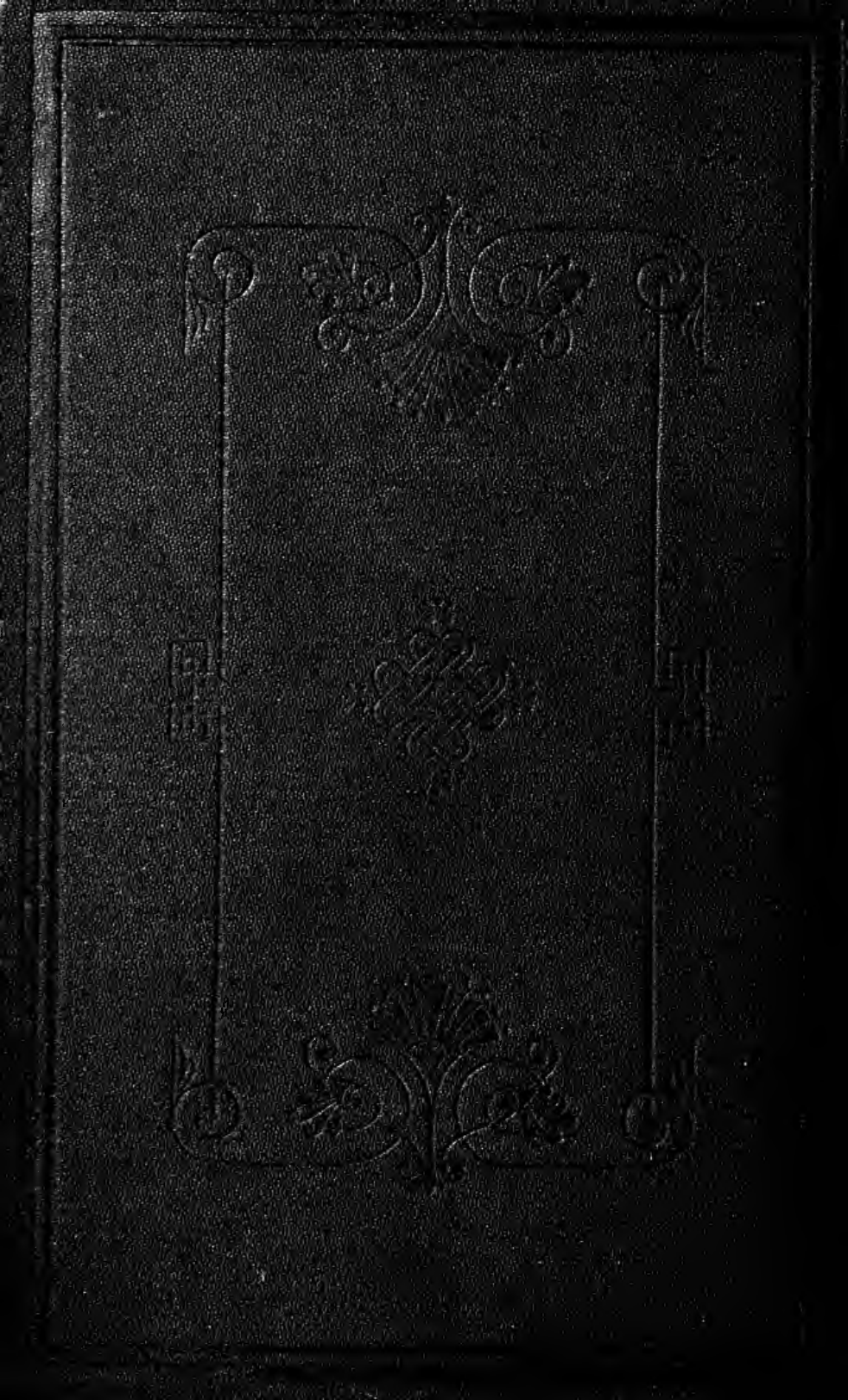

Concordia soll ihr Name seyn.

THE BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH AND THE PROMOTION OF FRIENDLY INTERCOURSE AMONGST PHARMACISTS.

This Association of Chemists and Druggists and others interested in Pharmacy is managed by about twenty unpaid officers annually elected by the members.

ANNUAL MEETINGS OF MEMBERS.

1863, Newcastle. 1864, Bath. 1865, Birmingham. 1866, Nottingham. 1867, Dundee. 1868, Norwich. 1869, Exeter. 1870, Liverpool. 1871, Edinburgh. 1872, Brighton. 1873, Bradford. 1874, London. 1875, Bristol. 1876, Glasgow. 1877, Plymouth. 1878, Dublin. 1879, Sheffield.

The chie business of the meetings is the communication o written descriptions of original investigations made by members during the year, and includes discussions on such papers by the assembled members and visitors.

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1864–5, H. DEANE, F.L.S.; 1866–7, Prof. BENTLEY, M.R.C.S.; 1868–9, D. HANBURY, F.R.S.; 1870–1, W. W. STODDART, F.C.S.; 1872–3, H. B. BRADY, F.R.S.; 1874–5, T. B. GROVES, F.C.S.; 1876–7, Prof. REDWOOD, F.C.S.; 1878–9, G. F. SCHACHT, F.C.S.

THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a handsome octavo volume of 500 or 600 pages, containing the proceedings at the yearly meeting and a report on the progress of pharmacy, or Year-Book, comprising abstracts of papers on pharmacy, materia medica, and chemistry, and on new preparations, processes, and formulæ, published at home and abroad during each year. The funds of the Conference, composed of annual subscriptions of seven shillings and sixpence, are devoted to the production of this useful book, no pains being spared to make it the desk companion of the year, and an invaluable permanent work of reference for chemists and druggists and others interested in pharmacy. The Executive Committee of the Conference trusts that members will show the current Year-Book to their friends and acquaintances—principals, assistants, or pupils—and obtain as large a number of new members as possible. Alphabetical lists of (1) the names and addresses of subscribers, and (2) of the towns in which they reside, will be found in each Year-Book.

NOMINATION FOR MEMBERSHIP.

Gentlemen desiring to join the Conference can be nominated at any time on applying to either of the officers or members. No special form of nomination is required. The Name and Address of each candidate to be written legibly, and forwarded to the Hon. Secretary, Professor Attfield, 17, Bloomsbury Square, London, W.C., who will sign the paper, if a member's name is not already appended. The subscription may be sent at the same time.

THE ANNUAL SUBSCRIPTION.

The Annual Subscription is Seven Shillings and Sixpence, payable in advance. For this sum each member is entitled to one copy of the Year-Book, carriage free; and to attend the Annual Meetings.

(Members residing abroad can be supplied with the Year-Book by pre-paying the annual subscription, and the postage to the respective countries, of a book weighing two imperial pounds. The subscription, including postage, for either Australia, Belgium, Canada, Cape of Good Hope, China, France, Germany, Gibraltar, Holland, Natal, New Zealand, United States of America, or the West Indies, is Ten Shillings.)

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The Conference year commences on July 1st, and Annual Subscriptions are due in advance on that date. They may be sent then or soon afterwards to the London Secretary—to the address given below. The Year-Book is posted as soon as published (in December) to every member who has previously paid his subscription. To members joining later the volume is posted immediately on receipt of a Money Order or other form of remittance. The price of extra copies of the volume for 1873, or subsequent issues, will be 7*s.* 6*d.*, post free,—foreign members, 10*s.* Price of the Year-Book to non-members, exclusive of postage, 10*s.*

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YEAR-BOOK OF PHARMACY

COMPRISING

ABSTRACTS OF PAPERS

RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS,

FROM JULY 1, 1877, TO JUNE 30,

1878.

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

FIFTEENTH ANNUAL MEETING

HELD IN

DUBLIN,

AUGUST, 1878.

LONDON:
J. & A. CHURCHILL, 11, NEW BURLINGTON STREET.
MDCCCLXXVIII.

British Pharmaceutical Conference.

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			Dr. Edwards, F.C.S.	Prof. Redwood, F.C.S.	
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			Dr. Edwards, F.C.S.	J. P. Tylee	
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			D. Hanbury, F.R.S.	W. W. Stoddart, F.G.S.	
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1868	Norwich . .	Daniel Hanbury, F.R.S.	R. Fitch, F.G.S.	W. W. Stoddart, F.G.S.	F. Sutton, F.C.S.
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			H. C. Baildon	J. Ince, F.L.S.	J. Dutton (Birkenhead).
1871	Edinburgh .	W. W. Stoddart, F.C.S. .	J. Abraham	J. Ince, F.L.S.	J. Mackay, F.C.S.
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THE

BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH, AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

The most important ways in which a member can aid the objects of the Conference are by suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is sent to members early in the year. Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meetings are usually held in the provinces, at the time and place of the visit of the British Association; that for 1879 will be held in Sheffield, on Tuesday and Wednesday, August 19th and 20th.

Gentlemen desiring to join the Conference can be nominated at any time on applying to either of the secretaries or any other officer or member. The yearly subscription is seven shillings and sixpence, payable in advance, on July 1st. Further information may be obtained from the secretaries—

Professor Attfield, 17, Bloomsbury Square, London, W.C.

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INTRODUCTION.

In presenting to our readers this our ninth volume of the *Year-Book of Pharmacy*, we have much pleasure in observing that the year which has just passed away—the fifteenth of the British Pharmaceutical Conference—has been productive of numerous contributions

ERRATA.

Page 110, line 35, *for* 5 *read* 50.
,, 147, ,, 24, *for* Phosphorus *read* Phosphorous
,, 518, ,, 42, *for* 0·138 *read* 0·0138.

cherous to-morrow. Thus, slowly and cautiously, the honest searcher after truth has to wind along his toilsome path, often retracing his steps and changing his route, in order successfully to accomplish his task. The chemistry of aconite root affords a striking illustration of the difficulties connected with researches of this kind. After several years of able and persevering work, not unaided by the results of others who have laboured in the same direction, the committee appointed by the British Pharmaceutical Conference to investigate this subject may be said to have succeeded in establishing a basis upon which, in the course of many more years, we may hope to witness the gradual erection of a firm and lasting edifice. Dr. Wright and Mr. A. P. Luff, who are continuing the committee's labours, report that improved processes for purifying the aconite bases have enabled them to correct some of the analytical results brought before the previous meeting of the Conference. Thus the formula of pseudaconitine, the alkaloid from *Aconitum ferox*, is now changed from $C_{36}H_{49}NO_{11}$ to $C_{36}H_{49}NO_{12}$, and, as a

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INTRODUCTION.

In presenting to our readers this our ninth volume of the *Year-Book of Pharmacy*, we have much pleasure in observing that the year which has just passed away—the fifteenth of the British Pharmaceutical Conference—has been productive of numerous contributions to the scientific literature of pharmacy. While a considerable number of remedies, some of them of recent introduction, have again formed the objects of medical and pharmaceutical research, chemistry has more than ever lent its aid in the elucidation of a variety of subjects more or less intimately connected with pharmacy. An ever increasing amount of attention continues to be devoted to the vegetable alkaloids and other proximate principles, and in the face of the importance of the subject and of the difficulties besetting its investigation, it is but natural that this should be so; for so vast are the dimensions of this field of inquiry that every step in advance seems but to reveal still vaster regions hitherto unexplored, and what to-day appears to be solid ground, may prove unsafe and treacherous to-morrow. Thus, slowly and cautiously, the honest searcher after truth has to wind along his toilsome path, often retracing his steps and changing his route, in order successfully to accomplish his task. The chemistry of aconite root affords a striking illustration of the difficulties connected with researches of this kind. After several years of able and persevering work, not unaided by the results of others who have laboured in the same direction, the committee appointed by the British Pharmaceutical Conference to investigate this subject may be said to have succeeded in establishing a basis upon which, in the course of many more years, we may hope to witness the gradual erection of a firm and lasting edifice. Dr. Wright and Mr. A. P. Luff, who are continuing the committee's labours, report that improved processes for purifying the aconite bases have enabled them to correct some of the analytical results brought before the previous meeting of the Conference. Thus the formula of pseudaconitine, the alkaloid from *Aconitum ferox*, is now changed from $C_{36}H_{49}NO_{11}$ to $C_{36}H_{19}NO_{12}$, and, as a

necessary consequence, that of its decomposition product, pseudaconine, from $C_{27}H_{41}NO_8$ to $C_{27}H_{41}NO_9$. These alterations are due to the observation that the substance previously described as pseudaconitine is not a definite base, but a mixture of pure pseudaconitine and *apopseudaconitine*, a new product derived from pseudaconitine by the elimination of the elements of a molecule of water.

$$\underset{\text{Pseudaconitine}}{C_{36}H_{49}NO_{12}} = H_2O + \underset{\text{Apopseudaconitine,}}{C_{36}H_{47}NO_{11}}$$

and that in a like manner the substance regarded last year as pseudaconine, and now distinguished as *apopseudaconine*, is really a dehydrated derivative of true pseudaconine, its composition being represented by the formula $C_{27}H_{39}NO_8$. The splitting up of pseudaconitine into pseudaconine and veratric (dimethylprotocatechuic) acid, as explained by the equation—

$$\underset{\text{Pseudaconitine}}{C_{36}H_{49}NO_{12}} + H_2O = \underset{\text{Pseudaconine}}{C_{27}H_{41}NO_9} + \underset{\text{Veratric Acid,}}{C_9H_{10}O_4}$$

is shown to be most readily effected by boiling the base for some hours with alcoholic solution of soda, and almost to occur when pseudaconitine is heated with water to nearly 100° in sealed tubes; but if in the latter process the temperature be raised to 140°, as recommended in the previous report, the decomposition is now stated to be accompanied by the formation of apopseudaconine, resulting from the dehydration of pseudaconitine to apopseudaconitine, and the subsequent saponification of the latter in accordance with the following representation,—

$$\underset{\text{Apopseudaconitine}}{C_{36}H_{47}NO_{11}} + H_2O = \underset{\text{Apopseudaconine}}{C_{27}H_{39}NO_8} + \underset{\text{Veratric Acid.}}{C_9H_{10}O_4}$$

All these rectifications of formulæ have resulted from the authors' success in producing nitrate of pseudaconitine in crystals, and regenerating from these the base in a much purer condition than the one previously experimented with.

Aconitine appears to form a series of derivatives precisely parallel with those obtained from pseudaconitine, as under corresponding conditions it is capable of yielding apoaconitine, aconine, and apoaconine. Its decomposition into benzoic acid and aconine, as explained in the former report, is found to be most complete if alcoholic solution of soda be employed as the saponifying agent; so complete indeed as to yield the theoretical amount of benzoic acid. As regards the alkaloid from Japanese aconite root, the authors are

doubtful as to whether the alkaloid they have extracted, and respecting which they have not yet furnished any precise analytical results, is identical with that isolated and examined by Messrs Paul and Kingzett, and reported upon at the Plymouth meeting of the Conference; but however this may be, it is now fully admitted by them that the alkaloid from this source is different from pseudaconitine, as well as from aconitine.

The same causes which render the study of the aconite bases so difficult a task threaten to prove equally troublesome in the investigation of the alkaloids of *Veratrum Sabadilla*, inasmuch as these show a similar tendency to undergo changes during the processes of their extraction and purification. Messrs Wright and Luff find that the seeds of this plant and the veratrine of commerce contain three distinct alkaloids, which they propose to distinguish by the names *veratrine*, *cevadine*, and *cevadilline*. Their veratrine is that of Couerbe; it is non-crystalline, and corresponds to the formula $C_{37}H_{53}NO_{11}$. Their cevadine, $C_{32}H_{49}NO_9$, is the crystallizable veratrine of Merck, and identical also with the veratrine of Schmidt and Köppen; whereas cevadilline is an amorphous alkaloid of the formula $C_4H_{53}NO_8$. Under the influence of saponifying agents veratrine yields dimethylprotocatechnic acid and a new base, *verine;* while cevadine, under the same conditions, furnishes methyl-crotonic acid and *cevine* (another new base); and these and other features induce the authors to assume a close alliance in constitution between these alkaloids and the aconite bases. The sabadilline of Weigelin and Dragendorff has not been found by them either in cevadilla seeds or in commercial veratrine; but it is mentioned again along with veratrine, veratroidine, sabatrine, and jervine in a report on the veratrum alkaloids by Mr. A. Tobien.

The cinchona alkaloids never fail to supply their annual quota to pharmaceutical literature. A review by Dr. O. Hesse deals with the entire subject, giving a brief description of all the known cinchona bases and their principal decomposition products. Another report by the same author is restricted to the results of a close investigation of cusconine and aricine, the alkaloids from cusco bark. Dr. de Vrij suggests a very simple test for the purity of commercial sulphate of quinidine, which is based on the comparative insolubility of hydriodate of quinidine in cold water. If, upon mixing a hot solution of the sulphate with potassium iodide, cooling, and filtering, the resulting filtrate be only slightly clouded by the addition of ammonium hydrate, the preparation may be considered as of good quality. The numbers obtained by him in a

series of carefully conducted analyses of cinchonine induce Mr. Z. H. Skraup to reject the formula $C_{20}H_{24}N_2O$, in favour of the older one of $C_{19}H_{22}N_2O$, which he also finds to agree better with the amount of potassium permanganate found to be required for the conversion of this alkaloid into cinchotenine and formic acid, the chief products of its oxidation. A neutral hydrobromate of cinchonine, answering to the formula $C_{20}H_{24}N_2O$, 2H Br, and a basic salt of the formula $C_{20}H_{24}N_2O$, H Br, H_2O, are described by M. Latour, together with similar combinations of morphine. In the place of the usual method of obtaining cinchonine as a by-product in the manufacture of quinine, MM. Cazeneuve and Caillol recommend a process for its direct extraction from grey loxa bark, which is known to be very rich in this alkaloid. The same authors show that quinine and cinchonine, in the amorphous condition in which they are obtained from solutions of their salts by precipitation with alkalies, may be very readily distinguished from each other under the microscope, by adding to the alkaloid suspended in water a drop of a solution of sulphate, oxalate, or phosphate of ammonium, whereupon the quinine is almost instantly seen to change into crystalline needles of its sulphate, oxalate, or phosphate, while cinchonine remains unaltered. The microscopic distinction of the sulphates of the different cinchona alkaloids by means of a solution of potassium sulphocyanide forms the subject of a report by Dr. R. Godeffroy. Several papers deal with the quantitative determination of quinine. Professor Prescott supplies some useful laboratory notes on the estimation of this alkaloid by the usual gravimetric processes; Mr. H. Trimble proposes a colorimetric method, based on the thalleioquin reaction; and Mr. A. C. Oudemans speaks of the use of the polaristrobometer as a valuable adjunct in the quantitative analysis of mixtures containing two or more of the principal cinchona alkaloids, and in the determination of quinine in cinchona barks. He finds that it is possible to determine, by means of this instrument, the exact amount of quinine in the mixed tartrates of quinine and cinchonidine, as obtained by precipitation from the solutions prepared from the barks, and that the disturbing influences, as pointed out by Dr. Hesse and others, are so slight as not appreciably to affect the accuracy of the determination. Prof. Flückiger reports on the action of sunlight on aqueous solutions of quinine, showing it to result in the conversion of this alkaloid into quiniretin, a brown, flocculent, neutral substance, having the same composition as quinine, but differing from it as well as from quinicine in all its principal physical and chemical properties.

Some light appears to be thus thrown on the nature of the injurious influence which sunlight has been observed by Carles, Broughton, and others to exert on quinine-yielding barks.

Mr. W. A. Shenstone's researches on brucine supply several interesting points of information, valuable alike to the chemist and toxicologist. Not only do they confirm, to the fullest extent, Mr. Cownley's results, disproving Prof. Sonnenschein's alleged conversion of brucine into strychnine by the action of nitric acid, but they show, too, that the very process by which this conversion was attempted affords an excellent means of detecting strychine as an impurity in this alkaloid, by which appreciable quantities of this admixture have now been proved to occur even in the best commercial samples of brucine, which the direct application of the bichromate test failed to show. This being so, it must be regarded as extremely doubtful if pure brucine has ever yet been submitted to physiological investigation, and whether its reputed poisonous properties are not partly or even wholly due to this contamination. Recrystallization of the commercial alkaloid from hot aqueous solutions slightly acidulated with acetic acid is now recommended as the best method of purification. Another part of Mr. Shenstone's report confirms the presence of strychine in false angostura bark.

Some of the latest contributions to the literature of opium bases require a brief notice in this place. Messrs T. and H. Smith announce the discovery, in this drug, of a new chemically indifferent body, meconoiosine, having the composition $C_8 H_{10} O_2$, and crystallizing in characteristic leaf-like masses. Prof. Prescott reports favourably on Husemann's test for morphine, showing it to be capable of indicating one-twelve-hundredth of a grain of this alkaloid. Codeine and narcotine are found by him to produce with this test somewhat similar colorations, which, with due care, however, can be distinguished from those obtained with morphine. A new and very delicate test for codeine and morphine, described by Mr D. Lindo, consists in the production of intense and characteristic blue colorations on heating solutions of these alkaloids in strong sulphuric acid with a drop of solution of ferric chloride. Of a large number of other alkaloids tested in this manner by Prof. How, not one was found to give results at all likely to be confounded with those produced with the two opium bases named. Another series of new reactions of morphine is published by Mr. Pellagri, and will be found recorded on page 112 of this volume. An experimental comparison of the principal published processes

for the estimation of morphine in opium leads Mr. G. D. Hays to the conclusion that a modification of Dr. Gregory's method answers best for this purpose. M. Prollius, on the other hand, recommends a much simpler process,—the simplest, perhaps, that has yet been proposed. One hundred volumes of a tincture made with spirit of 34 per cent. and containing 10 per cent. of opium, are shaken with 50 volumes of ether and 2 of ammonia, and the crystals of morphine, which separate from the mixture after twelve to twenty-hours' standing, collected, washed with diluted alcohol, dried, and weighed. If this very handy method should prove as exact as it is represented to be, it will be sure to meet with the fullest appreciation of all scientific pharmacists. Two reports on hydrobromate of morphine, one on the hydriodate of the same base, and one on apomorphine, also form part of the year's contributions to the chemistry of opium.

The alkaloids of *Atropa Belladonna* have been investigated by Prof. Buchheim, who confirms the observation that atropine, when treated with soluion of barium or sodium hydrate, is decomposed into tropine and tropic acid. Belladonnine, under similar conditions, is found by him to split up into tropine and *belladonnic acid*, a resinous body differing in its properties from tropic acid. While, therefore, atropine may be regarded as tropine in which one atom of hydrogen is replaced by the radical of tropic acid, belladonnine appears to be a combination of tropine with belladonnic acid. Mr. A. Poehl points out some striking chemical and optical differences between atropine and daturine, which, if confirmed, would definitely disprove the asserted identity of the two bases. The well-known differences in the physiological action of commercial samples of atropine are attributed by him to the frequent presence in this alkaloid of variable proportions of daturine.

In the face of the large amount of matter to be discussed in this introductory chapter, we can but very briefly allude to the remaining portions of the literature devoted to the alkaloids and similar active principles. MM. Lefort and Wurtz describe a new method for the preparation of emetine, which is based upon the comparative insolubility of its nitrate, and yields a perfectly pure product in the form of minute needle-shaped crystals. Mr. G. Brownen, in a communication to the British Pharmaceutical Conference, shows that this alkaloid may be profitably extracted from the unsightly deposits forming in ipecacuanha wine, and suggests the formation of an inert gallo-tannate of emetine as a not improbable cause of the comparative inactivity of old samples of this wine. The separation of the alkaloids of hyoscyamus, stramonium, and belladonna in

forensic analysis, forms the subject of an investigation by Mr. S. Wasilewsky. M. Tanret reports the isolation from the bark of the branches and roots of *Punica Granatum* of an alkaloid which, in honour of Pelletier, he proposes to name *pelletierine*. Whether the tænicidal properties of the bark are due to this alkaloid remains to be shown by further researches, which are promised by the author. Mr. A. W. Gerrard has extracted from the leaves of *Duboisia Myoporoides* a poisonous alkaloid, strongly resembling atropine both in its chemical and physiological properties, but probably not identical with it. *Sophorine*, another new alkaloid possessing marked toxic properties, has been shown to exist in the seeds of *Sophora speciosa*, by Prof. H. C. Wood. Neurine, an alkaloid contained in the yolk of eggs and in bile, and probably identical with amantine (a non-poisonous base occurring in certain poisonous mushrooms), is spoken of as a valuable remedy in diphtheria. The results of an investigation of the characters of conine by M. Petit, differ materially from those of other authors with reference to its rotatory power, boiling point, and density, and seem to prove that the rotatory power cannot be depended upon as a proof of the purity of this alkaloid. The action of permanganate on nicotine is described by Mr. R. Laiblin as resulting in the formation of pyridene-carbonic acid. Recent determinations of the vapour density of cantharidin indicate that $C_5 H_6 O_2$, the formula hitherto accepted for this substance, ought to be changed to $C_{10} H_{12} O_4$. Mr. J. Piccard, to whom this observation is due, also finds that, when heated with hydriodic acid to 100° C. in sealed tubes, cantharidin is converted into *cantharic acid*, a body of the same ultimate composition, but differing in its properties. Mr. D. B. Dott, in a note on beberine, read at the Dublin meeting of the Conference, announces that he has succeeded in preparing a crystalline hydrochloride, from the examination of which he hopes to ascertain the real composition of the base. Dr. Hager's statement that the citrate of caffeine of commerce is not an actual compound, but merely a mixture of the alkaloid with a small amount of free citric acid, is confirmed by Mr. P. J. Haasmann, who also arrives at a similar conclusion with reference to the valerianate. The ease and purity with which theine has been found to sublime is turned to practical account by Mr. A. W. Blyth, in processes for the identification of tea leaves and the quantitative estimation of the alkaloid. An estimation of various kinds of pepper by MM. Cazeneuve and Caillol, relative to the amount of piperin contained in them, show that the latter may vary in different samples from 5·2 to 9·2 per cent. Mr. D. Lindo suggests sulphuric acid, preceded

by phenol, as a test for elaterine, and the same acid, followed by ferric chloride, as a test for santonin; whilst silicotungstic acid is recommended by Dr. R. Godeffroy as probably the most delicate reagent for alkaloids in general.

The annual contributions to the chemistry and pharmacy of organic acids are, of course, but small in number as compared with the numerous reports dealing with the alkaloids. Salicylic acid still continues to receive some attention, but it has ceased to hold that prominent position in scientific literature accorded to it during the three or four previous years. A new formation of this acid, observed by Mr. F. Hermann, consists in the long-continued action of sodium on ethyl succinate, the two bodies being left together for months. Mr. J. Williams states that the commercial acid, as prepared by Kolbe's process, is contaminated with an acid differing from salicylic, and that the nature of this substance is at present under investigation. Perfectly pure salicylic acid, according to Mr. F. Farsky, crystallizes from concentrated solutions in slender needles, and from dilute solutions in larger prismatic forms; whereas, in the presence of impurities, irregular crescent-shaped, annular or tufted forms are obtained, according to the nature and quantity of the admixture. The capability of forming acicular crystals may therefore serve as a test for the purity of the acid. The same writer describes some compounds of salicylic acid with albuminoids, prepared from egg-albumen, casein, and fibrin, by several methods, and containing on the average 14·16 per cent. of salicylic acid, combined with 85·84 per cent. of the albuminoid, thus answering to the formula $C_{72}H_{112}N_{18}O_{22}S. + 2C_7H_6O_3$. Mr. A. Almén reports on the relative sensitiveness of the best known reactions of salicylic acid and phenol; while some new tests for the latter are introduced by Mr. A. W. Davy and Mr. D. Lindo. The test proposed by the former is a sulphuric acid solution of molybdic acid, the same, indeed, which, some time ago, he recommended for the detection of alcohol (see *Year-Book of Pharmacy*, 1877). Its reaction with phenol is stated to be so delicate that one drop of an aqueous solution, containing one-thousandth part of its weight of this substance, is sufficient to produce a distinct purple coloration, even in the presence of moderate quantities of organic matter. Mr. Lindo mixes a few drops of an aqueous solution of carbolic acid with sulphuric acid previously diluted with an equal volume of water, and then adds one or two drops of nitric acid, whereupon he obtains a deep brown coloration changing rapidly to a beautiful red. The same reaction, reversely applied, is recommended by him as a test

for nitric acid. A new reaction of citric acid, described by Messrs. A. Sabanin and N. Laskowsky, seems to afford a delicate and valuable test for this substance, by which it may be readily detected in the presence of malic, tartaric, and oxalic acids. The solution of the acid, when heated with ammonium hydrate to 120° C. in a sealed tube for about six hours, yields a yellowish liquid, which changes to blue on being poured into a capsule. Mr. E. Bohlig introduces an improvement in the manufacture of oxalic acid, consisting in the decomposition of the purified potassium or sodium oxalate (prepared from sawdust) by magnesium chloride or sulphate, and the subsequent liberation of the acid from the precipitated magnesium oxalate by means of hydrochloric acid. The product, when washed and recrystallized, is said to be chemically pure. In a report on the volatile acids of croton oil, Mr. J. Berendes confirms the supposition previously expressed by Messrs. Geuther and Fröhlig, that the tiglic acid they found in this oil is identical with methylcrotonic acid. An investigation of the fatty acids of cocoa butter, by Mr. Kingzett, disproves the statement of text books that this substance yields, almost exclusively, stearic acid, while showing the presence therein of several new acids of the formula $C_n H_{2n} O_2$.

Those who have hitherto devised methods for distinguishing coal-tar acids from creasote, appear to have confined their attention to carbolic acid, and to have overlooked the fact that cresylic acid, which always occurs in considerable quantity in the crude phenol used as a substitute or adulterant of wood-tar creasote, resembles the latter more closely than pure carbolic acid does, and fails altogether to respond to the tests proposed for the detection of this fraud. Mr. Allen, who draws attention to this point in a paper contributed to the recent meeting of the British Pharmaceutical Conference, mentions a variety of ways in which these three substances may be readily distinguished from each other, but admits that the majority of these tests fail when applied to mixtures. He relies on the boiling point of creasote and its behaviour to glycerin and collodion as the best indications of its purity. A report by MM. Bouchard and Gimbert, also deals with the tests for the purity of wood-tar creasote; while Messrs. Tiemann and Mendelsohn endeavour to establish structural relations between creosol and phlorol, its chief constituents.

Mr. R. Sachsse describes a new process for the estimation of glucose, consisting in the application of a titrated solution of iodohydrargyrate of potassium. The latter is heated to the boiling point, and the glucose solution then added until the whole of the

mercury is precipitated, the final point being determined by bringing a drop of the supernatant liquid in contact with a drop of a strongly alkaline solution of stannous chloride. This method has been critically examined by Messrs. F. Strohmer and A. Claus, who find it correct if applied to solutions of pure dextrose, but inapplicable to solutions of dextrose containing either dextrin or cane sugar. It may, however, also be used for the determination of inverted sugar in pure solutions; but in this case the test solution requires to be standardized against pure inverted sugar, as its action on the latter differs from that upon grape sugar. For the detection of glucose in urine by Boettger's test, Mr. O. Maschke recommends the previous precipitation of any traces of albuminoids by means of a solution of sodium tungstate strongly acidified with acetic acid, on the ground that the complete absence of all proteids is an essential condition to the success of the test. Bernard's volumetric process for the estimation of sugar in blood by means of Fehling's solution is considered as untrustworthy by Dr. F. W. Pavy, who, in its place, suggests a gravimetric method, consisting mainly in the conversion of the precipitated cuprous oxide into perfectly pure metallic copper, and the calculation of the amount of sugar from the weight of the latter. From the results of his experiments there appears to be virtually no difference between the quantities of sugar in arterial and venous blood, an observation which is in direct opposition to the conclusions arrived at by Dr. Bernard. Analyses of the ash of cane and beetroot sugars, carried out by Mr. J. W. Macdonald, exhibit considerable differences in the relative proportions of some of the constituents, especially of the soda and the ferric and aluminic oxides, which may serve as a ready means of distinguishing these two kinds of sugar.

Some attention has recently been devoted to hydrobromic ether on account of its asserted superiority as an anæsthetic to the agents usually employed. It is stated to possess properties intermediate to those of chloroform, bromoform, and ether, to produce no irritation, and to be rapidly and completely eliminated from the system by the respiratory passages. A process for its preparation, yielding a very pure product, is described by Mr. J. P. Remington. The determination of alcohol in ether and chloroform by means of fuchsine, forms the subject of a new colorimetric test, proposed by Mr. Allen, while Mr. A. Claus suggests the application of anthraquinone and sodium amalgam as a very delicate test for the detection of water in alcohol or ether.

We conclude our references to organic chemistry with a few brief

notices of reports on essential oils. Dr. Schacht controverts the statement made by Dr. E. Myleus (see *Year-Book of Pharmacy*, 1877, 144), that the commercial artificial oil of mustard was not pure enough for pharmaceutical use, and ascribes the results obtained by the latter to the fact that the oils examined by him did not represent the average quality obtainable in the market. He finds no difficulty in procuring samples of the artificial oil quite free from hydrocyanic acid or carbon bisulphide, boiling at 147°–148° C., having a specific gravity of 1·018, and, indeed, possessing all the characters of the natural oil. Russian oil of turpentine is described by Dr. Tilden as having an odour strongly suggestive of pitchpine wood and sawdust, and entirely distinct from that of other turpentine oils. In his opinion, this oil is not prepared from the exuding oleo-resin, but is a product obtained in the distillation of tar from the wood of various coniferæ. By agitation with solution of soda, and subsequent rectification, it yields a product of a fragrant odour, well adapted for pharmaceutical purposes. Oil of valerian is shown by M. Bruylants to pre-exist in the plant, and to consist of a terpene, $C_{10}H_{16}$; an alcohol, $C_{10}H_{18}O$, isomeric with borneol; formic, acetic, and valeric ethers of the latter; and an ether of the formula $(C_{10}H_{17})_2O$. The same author has examined the essential oil of tansy, the main constituent of which he finds to be *tanacetyl hydride*, an aldehyde isomeric with camphor, and therefore answering to the formula $C_{10}H_{16}O$. MM. Oberlin and Schlagdenhauffen report that the volatile oil contained in the bark of *Galipea Cusparia* amounts to nearly two per cent. of the drug. Its boiling point is 267° C., its specific gravity ·934, and its rotatory power + 5·4°. The physical characters of oil of limes are described by Messrs. Piesse and Wright, while the same service is performed with regard to oil of storax by Mr. J. H. van Hoff.

The past year will be for ever memorable in the annals of science on account of the final accomplishment of a feat, which the greatest skill and perseverance had hitherto failed to achieve, and which, after so many unsuccessful attempts, extending over a period of two generations, had almost come to be regarded as a hopeless task. We refer to the liquefaction of oxygen, hydrogen, nitrogen, and atmospheric air, which was successfully accomplished towards the close of 1877 by M. L. Cailletet, of Paris, and M. R. Pictet, of Geneva, independent of each other, and almost at the same time. Descriptions and woodcuts of the apparatus, by means of which these important results were attained, will be found in all the principal chemical journals.

Those of the year's contributions to the literature of inorganic chemistry which, owing to their connection with pharmacy, have found a place in this volume, deal, for the most part, with subjects of analytical interest. Mr. J. B. Hannay describes a new process for the volumetric estimation of hydrocyanic acid and cyanides, which is based on the fact that mercuric chloride, when gradually added to a solution of hydrocyanic acid previously rendered alkaline with an excess of ammonia, does not produce a permanent precipitate until the whole of the cyanogen present has been converted into mercuric cyanide in accordance with the following equation:—

$$2\,NH_4Cy + HgCl_2 = HgCy_2 + 2\,NH_4Cl.$$

The presence is very exact, and has the additional advantage of being applicable in the presence of free alkalies, cyanates, sulphocyanides, or even of silver salts, without the slightest loss of accuracy in the result. The principal methods for the determination of nitric acid have been critically examined, both by Mr. G. Lunge and Mr. J. M. Eder. The former speaks in favour of Pelouze's process, consisting in the decomposition of the nitric acid by ferrous sulphate and the determination of the excess of the latter by means of potassium permanganate. In the presence of nitrous acid he first determines this by permanganate, and then estimates the total quantity of nitric acid by ferrous sulphate. Mr. Eder also reports favourably on the estimation by ferrous salts, but obtains equally good results by the oxidation of chromium oxide to chromic acid, the conversion of the nitric acid into nitric oxide, or by its transformation into ammonia. The direct titration of nitric acid by standard ferrous solution, however, is found to give unsatisfactory results. Dr. P. Haubst applies the process for the titration of sulphates, recommended last year by MM. Jean and Pellet (see *Year-Book of Pharmacy*, 1877, 103), to the volumetric estimation of alkaline and earthy alkaline sulphates in potable waters. M. Jean publishes a handy method of estimating potassium and sodium in mixtures of these salts. It is based on the conversion of the salts into sulphates by heating with an excess of ammonium sulphate, and the subsequent conversion of the sulphates into carbonates by means of baryta water and carbonic acid. The quantities of sodium and potassium are calculated from the volume of standard hydrochloric acid required for the neutralization of the carbonates, and from the amount of chlorides left upon evaporation. A new test for potassium described by M. Carnot depends on the precipitation of the metal from alcoholic solutions as a double

hyposulphite of potassium and bismuth. In order to render this test also available for quantitative purposes, it is proposed to estimate the hyposulphurous acid contained in the precipitate by means of a titrated solution of iodine. Mr. W. M. Hutchings proposes the substitution of cuprous iodide for potassium iodide in Von Kobell's test for bismuth. Another very delicate test for the same metal, suggested by Prof. Field, is based upon a curious reaction exhibited by potassium iodide with solutions of lead in the presence of bismuth. The scales of lead iodide formed in this reaction are not of the usual golden yellow colour, but assume a dark orange or crimson tint, varying according to the amount of bismuth present. The great delicacy of this reaction is confirmed by Messrs. H. G. Greenish and J. F. Savory. For the detection of minute traces of copper, M. Cresti recommends the use of a zinc-platinum element formed of two thin wires, and the recognition of the coating produced on the platinum by the production of a deep violet colour upon exposing the latter to a mixture of hydrobromic acid gas and bromine vapour. Zinc, like copper, appears to be a frequent if not a constant constituent of the human organism; such, at least, is the conclusion to be drawn from experiments conducted by MM. Lechartier and Bellamy. This metal has also been detected by the same chemists in the livers of various animals, in beef, in eggs, and in a variety of cereals and vegetables. Two new indicators have been introduced for the purposes of alkalimetric titrations, viz., phenol-phtalein, and a new colouring matter, tropaolin, both of which are claimed to possess special advantages. The observation made by Mr. W. Iles that borax, when heated with glycerin in a Bunsen flame, imparts to the latter the green colour characteristic of boracic acid, is turned to further account by Dr. A. Senier and Mr. A. J. G. Lowe in a process for the detection of glycerin, consisting in a reverse application of this reaction. Another report by the same authors throws some light on the proportion of boracic acid actually liberated from borax by the action of glycerin. An investigation of the action of hydrochloric acid upon metallic sulphates by Prof. Prescott shows that the extent of the decompositions thus effected is, in some instances at least, much greater than is generally supposed; while from Prof. Mohr's experiments, even carbonic acid appears, in a number of cases, to be capable of expelling stronger acids from their metallic combinations.

Processes for the preparation of hydrobromic acid for medicinal use are described both by Dr. E. R. Squibb and Dr. H. Hager, the

former of whom recommends the evolution of the acid from a mixture of potassium bromide and dilute sulphuric acid, while the latter prefers a mixture of sodium hyposulphite, bromine, and water for this purpose. The acid liquid, produced by the slow deliquescence of phosphorus in moist air, which was formerly regarded as a variable mixture of phosphorous and phosphoric acids, is found by Mr. T. Salzer to contain a new acid of phosphorus, represented by the formula $H_2 P O_3$, and corresponding with the anhydride $P_2 O_4$. This he proposes to call hypophosphoric acid. Mr. W. Stevenson recommends the preparation of alkaline iodides and iodates from the corresponding barium compounds, both of which are obtained by the addition of iodine to barium hydrate. An examination of the various methods of preparing mercurous iodide leads M. Schlagdenhauffen to the conclusion that none of them yields a pure preparation. M. Le Canu suggests the trituration of the mercury with alcohol, so as to obtain the metal in a finely divided condition, previous to the addition of the iodine, and expresses himself satisfied with the purity of the product. M. Patrouillard, on the other hand, prefers the preparation of this substance from mercuric iodide and metallic mercury, by trituration with a little alcohol and subsequent washing with the same menstruum. The direct preparation of sodium or potassium carbonate from their chlorides is effected by Mr. E. Bohlig by a process based on the intervention of magnesium oxalate, the various steps of which may be briefly indicated by the following equations:—

$$Mg C_2 O_4 + H Cl + Na Cl = Na H C_2 O_4 + Mg Cl_2.$$
$$Na H C_2 O_4 + Mg C O_3 = Na H C O_3 + Mg C_2 O_4.$$
$$2 Na H C O_3 + Mg O = Na_2 C O_3 + Mg C O_3 + H_2 O.$$

The magnesium oxalate, therefore, is always reproduced in the process.

Mr. Sergius Kern announces the discovery in platinum ores of a new element, to which, in honour of Sir Humphrey Davy, he gives the name of *Davyum*.

Of the numerous vegetable drugs which during the past year have formed objects of chemical or physiological investigations, some have been already referred to on the preceding pages in connection with their active constituents. Thus the seeds of *Sophora speciosa*, a poisonous paralyzing drug collected in Texas, has been mentioned in connection with sophorine, its active principle; false angostura bark in connection with strychnine; the bark of *Punica*

Granatum with reference to the alkaloid pelletierine; and the leaves of *Duboisia Myoporoides* in a like manner in connection with its alkaloidal principle. The last-named drug is stated by Mr. Holmes to be derived from an Australian tree growing plentifully in the neighbourhood of Brisbane, but occurring also in New Caledonia and New Guinea. So closely do the physiological properties of the extract of this drug agree with those of extract of belladonna, that Dr. Ringer and Mr. Tweedy, who carried out a series of experiments in this direction, could not establish any appreciable distinction between the two; and but for some decided differences in the chemical characters of their active principles, pointed out by Mr. Gerrard, the alkaloid duboisine would probably, for the present at least, be regarded as identical with atropine. But while these and several other subjects of materia medica have already been touched upon in the preceding pages, many more, not yet alluded to, remain to be noticed. Dr. F. V. Greene announces the isolation from the berries of the jurubeba plant of an alkaloidal principle named by him *jurubebine*, and described as a substance differing in many of its characters from the glucoside solanin and the known alkaloids of the Solanaceæ. Jurubeba, the plant in question, is the *Solanum paniculatum* of Brazil, known also as juripeba, jupeba, and jubeba, the juice of the leaves and fruits of which is recommended in obstructions of the abdominal viscera and in vesical catarrh. Experiments, made by Mr. C. H. Cressler with an oleo-resin prepared from the rhizome of *Aspidium marginale*, appear to prove that this plant is as efficacious a remedy for tapeworm as the true male fern. The observation is important to medical practitioners in the United States, in many parts of which *Aspidium Filix mas* is comparatively scarce, whereas *Aspidium marginale* occurs in great abundance. The fatty oil contained in the seeds of *Euphorbia Lathyrus*, to the extent of 42 per cent., is recommended by Mr. O. Zander as an external irritant, in the place of the more expensive croton oil, which it also resembles in its purgative properties. The vesicant properties of croton oil are found to be confined to that portion of the oil which is soluble in alcohol. Mr. H. Senier, to whom this observation is due, arrives at the conclusion that, for medicinal and pharmaceutical purposes, an oil extracted by alcohol would be a more satisfactory preparation than the crude oil. Professor Bentley, however, points out that the superiority of the oil extracted by alcohol stands proved only with reference to its vesicant action, and that it remains yet to be shown whether the purgative principle of croton oil is the same as its vesicating principle. Dr.

Preobraschensky's assertion that nicotine is the active principle, or at least a normal constituent, of *Cannabis Indica*, is called in question by Prof. Dragendorff and Dr. Marquiss, who base their doubts on the essential difference between the therapeutic effects of this drug and those of tobacco, and attribute Dr. Preobraschensky's results to a contamination of the Indian hemp operated upon, either with tobacco or some other plant yielding a volatile alkaloid. From pituri, an interesting Australian drug reported to possess extraordinary stimulating properties (see *Year-Book of Pharmacy*, 1874, p. 52, and 1877, p. 222), Mr. Gerrard has isolated an alkaloidal substance, probably its active constituent, which he proposes to name "piturine." Its physiological action is at present under investigation.

Baycuru, a Brazilian drug, probably derived from *Statice Brasiliensis*, is introduced to the notice of British practitioners by Dr. C. Symes on account of its reputed value as an astringent and discutient remedy in all kinds of enlargements and glandular swellings. Its activity appears to be chiefly due to tannin, of which this root contains no less than 12·5 per cent. of its weight. Mr. J. R. Jackson describes a new Algerian remedy, under the name of "*Sanguinaire*" or "*Thé Arabe*," which is stated to be a valuable tonic, stomachic, and expectorant. It consists of the flowerheads of *Paronychia argentea*, a plant widely distributed through the Canary Islands, Spain, and the Mediterranean region. The term "Thé Arabe" is, however, not confined to this remedy, but is also applied to infusions of *Globularia Alypum*, *Cistus albidus*, and *Verbena triphylla*. A report on the useful species of Viburnum, by Prof. Maisch, deals with *V. obovatum*, *V. prunifolium*, *V. opulus*, *V. Dahuricum*, *V. Tinus*, *V. odoratissimum*, and *V. lantana*. The most useful of these appears to be *V. prunifolium*, which is strongly recommended, both by Dr. Phares and Dr. E. W. Jenks, as a prophylactic against abortion. The medicinal properties of *Œnothera biennis* seem to be attracting considerable attention among American practitioners. It is spoken of as a mild but efficient sedative in nervous irritability, whooping cough, spasmodic asthma, and certain sensitive conditions of the stomach. The value of *Grindelia Robusta*, as a remedy for whooping cough, is confirmed by Dr. Patter, who obtained excellent results with the tincture, administered in doses of half a dram every hour or two, but found most of the fluid extract of commerce to be worthless. In the face of Prof. Maisch's observation, recently confirmed by Mr. Holmes, that much of the drug sold as *Grindelia Robusta* belongs to other species (chiefly to *G. squarrosa*), the

variable and unreliable nature of commercial preparations of this plant is by no means surprising. *Thuja occidentalis*, in the shape of a fluid extract, a tincture, and an elixir, is recommended for a variety of ailments, but chiefly for pulmonary and uterine disorders. Several medical writers confirm the reported value of tayuya as a remedy for syphilis and various skin diseases. The leaves of *Lythrum Salicaria* are reported by Dr. Campardon to possess astringent and tonic properties, and to be particularly useful in dysentery. Dr. H. K. Pusey has investigated the action of *Asclepias Syriaca*, which he finds to be very useful as a diaphoretic and diuretic in dropsical affections. Prof. Maisch gives a description of the rhizome of *Pterocaulon pycnostachyum*, the *blackroot* of Georgia, which is much used in the Southern States as an alterative. Two other plants described by the same author, are *Dioscorea Villosa* and *Ledum latifolium*, the former of which is regarded to possess antispasmodic, diaphoretic, expectorant, and emetic properties; while the latter is mentioned as a soporific and cathartic. Both have met with previous notices. Dr. W. H. Long draws attention to mistletoe (*Viscum album*) as a valuable oxytocic, which, in the course of ten years' experience, he has found to be superior to ergot. Mr. Holmes, in his "Notes on Medicinal Plants of Liberia," gives a description of *Ocymum viride*, which enjoys much reputation among the natives as a remedy for fever of any kind, and is regarded as an efficient substitute for quinine. Its medicinal properties are stated to be possibly due to the presence of thymol. The same report contains an account of the hemorrhage plant, *Aspidia latifolia*, the hæmostatic powers of which are said to partake of the marvellous. Reports by Mr. M. C. Cooke and Prof. Flückiger furnish valuable additions to the literature of *costus*, the root of *Aplotaxis amiculata*, the history of which seems to date back as far as the third century, B C. Mr. W. Dymock again supplies numerous items of information respecting Indian drugs.

The physiological effects of coca leaves, upon which there exists much diversity of opinion, has been reinvestigated by Mr. E. B. Shuttleworth, who reports that in the majority of cases which came under his observation, its power of preventing fatigue was well established. The deterioration of coca by age suggests a probable explanation of the difference in the conclusions arrived at by different investigators. The poisonous properties of *Cicuta virosa* are attributed to a resinous principle, named cicutoxin, the action of which is stated to be remarkably similar to those of picrotoxin (from *Anamirta Cocculus*), of coriamyrtin (from *Coriaria myrtifolia*), and

the resin of *Taxus baccata*, the yew tree. The strongly toxic properties of yew leaves are fully confirmed in a recent report by Prof. Redwood. With reference to curara, the proposed remedy for hydrophobia, much interesting information has been collected by Mr. Moss, a full report of which will be found on pp. 210–214 of this volume. The hypodermic injection of an aqueous solution containing one grain of curara in every 12 minims is recommended by him as the best method for its administration. Curarine, its active principle, according to recent analyses by Dr. T. Sachs, has a composition answering to the formula $C_{36}H_{35}N$.

To Prof. Bentley pharmacists are indebted for a second report on the history, properties, and uses of *Eucalyptus*. Much of the healthy influence unquestionably exerted by these trees is attributed by him to the volatile emanations from the leaves, as, under the influence of light and moisture, the oil of eucalyptus, like many other essential oils, is capable of producing peroxide of hydrogen and camphoric acid.

Though a large amount of able attention has for a long time been devoted to the investigation of the constituents of ergot, the subject appears still far from being exhausted. Prof. Dragendorff announces that the body named by him sclererythrin, is not a definite principle, but a mixture of sclererythrin proper, picrosclerotine (a bitter alkaloid), and fuscosclerotic acid. The existence of Tanret's ergotinine, as a distinct alkaloid, is no longer denied; but on the other hand, it is no longer claimed by its discoverer to be the active principle of ergot. Several papers deal with the pharmacy of ergot. In one of these, Mr. A. W. Postans recommends a fluid extract made by maceration and percolation with a mixture of spirit, glycerin, and water, as a good pharmaceutical preparation. Dr. Buri announces the isolation from elemi of a third crystallizable constituent of an acid character, which he names elemic acid. Its formula is $C_{35}H_{56}O_4$. The acid contained in willow bark is shown by Mr. D. B. Dott to be identical with lactic acid. Gurgun balsam is found by Prof. Flückiger to contain a crystallizable indifferent resin of the formula $C_{35}H_{46}O_2$. Mr. Naylor reports upon a spurious balsam of tolu, which, from the results of its examination, appears to be a natural product of new importation rather than a tampered or manufactured article. From Pao-Pereiro bark, Dr. Hesse has isolated two distinct alkaloids, viz., *geissospermine*, $C_{19}H_{24}N_2O_2$, which is crystallizable, and an amorphous alkaloid, for which he retains the name *persicine*. Prof. Dragendorff's results of a series of analyses of rhubarbs, seem to prove that cathartic acid must be regarded as the principal active constituent of this

root. The presence of free chrysophanic acid in the Siberian and English rhubarbs, and its absence in the other kinds, may be mentioned as another out of the many points of interest contained in the same report. That the true Russian rhubarb is not the produce of *Rheum officinale* may now be regarded as an established fact; for such it is clearly proved to be by the results of examinations conducted by Mr. Holmes and Mr. H. Senier, and reported in this volume.

Among the subjects more exclusively connected with practical pharmacy, we refer in the first place to an important research on the strength of officinal cinchona preparations, communicated by Mr. Ekin to the Dublin meeting of the Conference. From this it appears that almost the entire quantity of total alkaloids contained in the bark passes into the tincture, whilst the decoction and infusion contain about five-eighths, and the liquid extract only one-fourth of the total alkaloids of the bark operated upon. Proof spirit, therefore, is evidently the best menstruum for exhausting the bark. Mr. J. C. Thresh, in another very interesting communication to the same meeting, shows that a soluble essence of ginger, possessing all the aroma of the rhizome, together with a fair share of its pungency, can be prepared by exhausting a pound of Jamaica ginger with rectified spirit by maceration and percolation so as to obtain 16 ounces of percolate, agitating the product with 2 ounces of heavy carbonate of magnesia, then shaking the whole with 24 ounces of water, and filtering. Mr. Proctor finds that the milkiness produced on mixing the officinal essence of ginger with water soon disappears on the addition of a little sulphuric acid or alum. Tincture of cantharides, in Mr. W. Kennedy's opinion, ought to be made with rectified instead of proof spirit, as the latter does not dissolve the cantharidin so well as alcohol, and also because the tincture made with the stronger spirit is not liable, like the officinal preparation, to form a deposit on keeping. Mr. F. M. Rimmington criticises the directions of the B.P. for preparing spirit of nitrous ether, stating that the interruption of the distillation after the first 12 fluid ounces have passed over, in order to introduce the second portion of the nitric acid, involves loss of time and injures the product. Mr. J. Williams shows how readily pure nitrite of ethyl can be prepared, and thinks that the preparation of spirit of nitrous ether from definite quantities of this substance and of pure alcohol may, at some future day, replace the official process, which can never yield a definite and constant product. Commercial specimens of nitrite of amyl are found by Mr. Dott to vary in strength and purity to a very large extent.

Thymol is rapidly gaining favour as an antiseptic and antifermentative, and is already considered by several writers as superior in this respect to carbolic and salicylic acids. Formulæ will be found in this volume both for its external and internal administration. From a series of comparative experiments by Mr. R. V. Mattison, respecting the antifermentative power of salicylic acid, benzoic acid, and calcium bisulphite, the action of benzoic acid appears to be the most marked. A solution of pepsin, containing this principle in a highly active condition, is obtained by M. Andouard by washing the stomach with water, precipitating the pepsin by sodium chloride, and removing the latter by dialysis. The resulting pepsin solution is then mixed with its own weight of glycerin. Reports by Mr. J. Laurie and Mr. G. Masson deal with improvements in the preparation of syrups of phosphates. The use of soap is suggested by M. Petit for facilitating the admixture of extracts with cacao butter in the preparation of suppositories. As the best mode of dispensing monobromated camphor, it is proposed by M. Lepage to dissolve it in almond oil, and to emulsify the solution with gum arabic. Mr. T. B. Groves, in a paper read at the late Conference meeting, describes a miscible copaiba obtained by treating maranham balsam with a saturated solution of potassium carbonate. When shaken with water it forms a uniform emulsion. The reading of Mr. Groves' paper was followed by that of an interesting communication from Mr. T. Greenish, illustrating how desirable it is for pharmacists to possess a knowledge of vegetable histology. The pink coloration produced in orange-flower water by nitric acid is proved by Messrs. R. Reynolds and C. H. Bothamley to be the result of the action of the acid upon the essential oil. The same authors also publish the results of their analyses of commercial samples of dialysed iron. How much this preparation is gaining in popular favour may be seen from the fact that it forms the subject of no fewer than seven reports recorded in this volume. Five of these deal with its composition and mode of preparation, while in two it is spoken of as a valuable antidote for arsenic.

If, from a desire to avoid an unreasonable extension of this introductory chapter, we have left many of the contents of this volume undiscussed, we hope at least to have succeeded in giving a condensed summary of those items of the pharmaceutical literature of the year which, in point of interest and importance, have the first claim to the attention of our readers. With this we consider our task as accomplished.

PHARMACEUTICAL CHEMISTRY.

YEAR-BOOK OF PHARMACY.

PART I.

PHARMACEUTICAL CHEMISTRY.

A New Process for the Volumetric Estimation of Hydrocyanic Acid and Cyanides. J. B. Hannay. (*Journ. Chem. Soc.*, 1878, 245.) The process recommended by the author is based on the anomalous behaviour of mercuric cyanide with alkalies, and is conducted as follows:—The hydrocyanic acid or alkaline cyanide to be tested is dissolved in water, the solution placed in a beaker on a black slab or black velvet, rendered strongly alkaline with ammonia, and standard decinormal solution of mercuric chloride added to it in successive quantities, with frequent stirring, until a permanent bluish white opalescence is produced. This does not occur until the whole of the cyanogen present has been converted into mercuric cyanide according to the following equation:—

$$2\,K\,C\,N + Hg\,Cl_2 = Hg\,(C\,N)_2 + 2\,K\,Cl.$$

The end of the reaction is so sharply marked that a drop of a centinormal solution is sufficient to produce a strong opalescence.

The process gives very accurate results, and is not interfered with by the presence of the alkalies, cyanates, sulpho-cyanides, or silver salts.

Ergotinine. C. Tanret. (*Journ. de Pharm. et de Chim.*, xxvi., 320–324.) This alkaloid was discovered by the author in 1875 (see *Year-Book of Pharmacy*, 1876, 98). Shortly afterwards Prof. Dragendorff, in his report upon the principles of ergot (*ibid.* 250), stated that he did not consider it as a chemically distinct body, but as a mixture containing sclererythrin and other substances; but this view was subsequently contradicted by M. Tanret, who supplied analytical evidence to show that his alkaloid did not

contain even a trace of sclererythrin (*ibid.* 20). He now reports that it occurs in ergot of rye in the proportion of about one gram per kilogramme, and that it is accompanied therein by another substance possessing properties similar to those of camphor.

Ergotinine in its pure crystalline form is insoluble in water, but dissolves in alcohol, ether, and chloroform. Both in the solid state and in alcoholic solution it absorbs atmospheric oxygen and turns brown. The alcoholic solution exhibits a green fluorescence. The salts of ergotinine are said to be decomposable by water, although the sulphate has been obtained in a crystalline state.

The Preparation and Composition of Emetine. J. Lefort and F. Wurtz. (*Répert. de Pharm.*, 1877, 385.) The authors' method for the preparation of this alkaloid is based on the comparative insolubility of its nitrate. A solution of 500 grams of alcoholic extract of ipecacuanha in half a litre of water is mixed with cold saturated solution of potassium nitrate in slight excess, the mixture allowed to stand for twenty-four hours, and the blackish brown precipitate of impure nitrate of emetine, which has deposited during that time, purified by collecting it on a filter and washing it three or four times with small quantities of water. The washed precipitate is dissolved in alcohol, the solution poured into milk of lime, the mixture evaporated to dryness, and the powdered residue exhausted with ether. On evaporating the ethereal solution in a retort, a yellowish brown syrup is left, and this, when treated with water acidulated with sulphuric acid and filtered, yields solution of sulphate of emetine free from resin. From this solution ammonium hydrate throws down the alkaloid as a yellowish white precipitate, which is washed and purified by dissolving it again in ether and evaporating the solution in vacuo.

Thus prepared emetine is perfectly pure, and forms aggregations of minute needle-shaped crystals, radiating from a common centre. The results obtained in its ultimate analysis lead to the formula $C_{28}H_{40}N_2O_5$.

Atropine and Daturine. A. Poehl. (*Amer. Journ. Pharm.*, from *Petersb. Med. Wochenschr.*) The author has investigated the cause of the well-known and generally acknowledged difference in the medicinal activity of commercial atropine and its salts, which Hagar has been inclined to attribute to the presence of another alkaloid, probably belladonnine. The supposed chemical identity of atropine and daturine, asserted by Planta, has led to the practice of preparing atropine not only from the root and leaves of belladonna, but likewise from the leaves and seeds of stramonium. The author has

recently again examined the two alkaloids prepared by himself, and found the following differences: Atropine is optically inactive, but daturine turns polarized light to the left, its specific rotating power being – 14′ 12°. Atropine salts are precipitated by platinic chloride, but daturine salts are not affected by the same reagent. Atropine salts are not precipitated by picric acid, which, however, precipitates daturine salts. The two alkaloids are therefore chemically not identical, and the difference in the physiological action of commercial atropine is doubtless due to the absence of presence, in larger or smaller proportions, of daturine.

Test for Elaterin. D. Lindo. (*Chemical News*, xxxvii., 35.) If a few crystals of elaterin are placed in a small porcelain dish, and a few drops of melted carbolic acid are added, the crystals dissolve without colour. On now adding a few drops of concentrated sulphuric acid, a magnificent intense crimson colour makes its appearance, which changes first to orange, and after a while to scarlet. The colour is destroyed by alkalies. No other proximate principles or alkaloids, so far as known, give this reaction. Instead of melted carbolic acid, fragments of the crystals may be taken and dissolved by a few drops of alcohol or chloroform. With sulphuric acid alone, elaterin does not give a characteristic colour. The test can be applied direct to some commercial samples of elaterin, if they are reduced to fine powder. Other samples require agitation of the powder with chloroform, filtering, and evaporating the filtrate, to submit the residue to the test.

Separation of the Alkaloids of Hyoscyamus, Stramonium, and Belladonna in Forensic Analysis. S. Wasilewsky. (*Amer. Journ. Pharm.*, 1877, 401, from *Pharm. Zeitschr. für Russland.*) 720 grams of each of the cut leaves were mixed with flour and fat, then twice digested at 50° C. for twenty-four hours with water acidulated with hydrochloric acid, the solutions evaporated by means of a water bath to a thin syrup, the residue mixed with three times its volume of alcohol, the mixture set aside for twenty-four hours, then filtered, and concentrated to remove the alcohol. The aqueous residue was agitated with petroleum benzin until the latter remained colourless; it was then rendered alkaline by ammonia, and twice extracted with benzol, which was afterwards evaporated to recover the alkaloids. The alkaline mother-liquors were acidulated with hydrochloric acid, agitated with ether, again rendered alkaline, and exhausted twice with ether. The mother-liquors were again similarly treated, only chloroform being substituted for the ether. The following shows the yields:—

From Benzol.

Hyoscyamus . .	·006 gram, yellowish amorphous.
Stramonium . .	·003 gram, white.
Belladonna . . .	·005 gram, white.

From Ether.

Hyoscyamus . .	·003 gram, amorphous.
Stramonium . .	·005 gram, crystalline.
Belladonna . . .	·008 gram, crystalline.

From Chloroform.

Hyoscyamus . .	·108 gram, amorphous.
Stramonium . .	·376 gram, yellowish crystals.
Belladonna . . .	·410 gram, yellowish crystals.

On treating the mother-liquors with amylic alcohol, those of hyoscyamus only yielded traces of alkaloid. The liquids used for removing the colour from the acid solutions were free from alkaloids, except the chloroform, which is therefore not adapted for this purpose.

False Angostura Bark and Brucine. W. A. Shenstone. (From a paper read before the Pharmaceutical Society, Dec. 5th, 1877; *Pharm. Journ.*, 3rd series, viii., 445.) In a previous research on the action of dilute nitric acid on brucine, the author found that all commercial samples of this alkaloid contained strychnine, and that the latter could not be detected as an impurity in the former by the direct application of the ordinary test with bichromate and sulphuric acid. He now gives the following directions for its detection:—

About ·5 gram of brucine is placed in a test tube with 3 or 4 c.c. of the dilute acid, and warmed rather gradually by immersion in a beaker of hot water; effervescence occurs, and presently yellow crystals of cacotheline are deposited. Directly these make their appearance, solution of potassium hydrate is added in excess, and the mixture is cooled by placing the test tube in cold water; it is then extracted by agitation with chloroform, and the residue obtained by evaporating the chloroform is tested in the usual way. When the amount of strychnine is small, it is necessary to char the residue with sulphuric acid before testing it, as the chloroform usually extracts a small quantity of a resinous substance which masks the reaction of the strychnine. This interfering substance, to a great extent, was removed by washing the chloroform with a small quantity of water to which a drop of solution of ammonia had been added.

The quantitative estimation by the same process showed the

following percentages of strychnine in four samples of brucine obtained from sources of high character: 1·5, ·43, 1·05, and ·25.

In the place of repeated partial precipitation, previously recommended by the author for the purification of brucine, he now crystallizes the alkaloid by cooling a solution of it in boiling water, to which a few drops of acetic acid have been added. He finds that one crystallization has considerably more effect in removing strychnine than a single precipitation, that it entails less loss, is less troublesome, and yields the alkaloid in a much better condition. It is imperative, however, to avoid the application of prolonged heat to a solution containing brucine, in this or in any other part of its manufacture or purification.

The relative solubilities of brucine in hot and cold water are generally inaccurately stated; usually it is said to dissolve in 850 parts of cold, and in 500 parts of boiling water. This is very far from being correct. Hanbury, in "Pharmacographia," states that 1 part dissolves in 150 parts of boiling water, which is more in harmony with the author's experience.

Mr. Shenstone's examination of false angostura bark removes all doubt as to the existence therein of a small quantity of strychnine. This he succeeded in isolating by the following process:—

Three and a half ounces of the bark were exhausted by roughly powdering and repeatedly boiling with fresh portions of rectified spirit; the various alcoholic decoctions so obtained were united and the spirit distilled off, the residue was diluted with water, and evaporated to a small bulk to remove the last traces of spirit; then again diluted, warmed, and after cooling filtered. To the filtered solution excess of subacetate of lead was added to precipitate colouring matter, which was filtered off, and the lead removed from the filtrate by a current of sulphuretted hydrogen; after boiling to expel excess of this gas, the liquid was boiled with magnesia, filtered, and the residual magnesia well washed with boiling water, the washings being added to the filtrate. The mixed filtrate and washings were evaporated to dryness, the residue dissolved in acidulated water, and the acid solution, rendered alkaline by ammonia, repeatedly washed with ether. The united ethereal solutions were distilled, and the extract remaining after distillation was treated for some hours with sulphuric acid on a water bath, then diluted, and after addition of excess of ammonia again extracted by agitation with ether. This ether on evaporation yielded a residue which, though not colourless, gave ample indication of consisting largely of strychnine. The impurities appeared to be a trace of brucine,

and a resinous body difficult of destruction, which at first prevented the strychnine from crystallizing, though the hydrochloride was afterwards obtained in the crystalline form.

The brucine, whose physiological action was examined by Pelletier and Caventou, was prepared from the bark, and therefore probably contained strychnine, and from the results of the author's examinations of commercial brucine, and the varying reports of the degree of its activity given by investigators, he considers it very doubtful if the physiological effects of *really pure* brucine have even been studied, and that it is not impossible that the strong resemblance of its action to that of strychnine may even be due to the proportion of strychnine which it contains.

Coloured Crystalline Compounds from Brucine. D. Lindo. (*Journ. Chem. Soc.*, 1878, 437.) Sulphurous acid and other reducing agents convert the yellow nitro-compound—which is formed by the action of nitric acid on brucine—into a violet crystalline substance, which may be readily obtained by heating brucine with concentrated nitric acid until it becomes yellow, and then adding sulphurous acid solution in excess. A yellow crystalline nitrate of another base is also obtained in minute crystals on heating brucine with nitric acid, as above, allowing it to cool, and adding alcohol. These two coloured compounds are readily converted into each other by the addition or removal of oxygen. The violet crystals dissolve in a strong solution of potassium hydrate, with an intense blue colour, which quickly changes to yellow, the mixing of the two colours producing a fine green. The reaction is very delicate.

Note on the Decomposition of Ammoniacal Salts by Quinine. MM. Cazeneuve and Caillol. (*Répert. de Pharm.*, 1877, 353.) The authors, in the course of an article on the preparation of cinchonine, mention some singular results obtained by Professor Glénard, of Lyons, in his investigations on the chemical behaviour of quinine and cinchonine, which make it possible to distinguish these two alkaloids from each other under the microscope. Quinine, mixed with distilled water, presents under the microscope an amorphous character, if it has been prepared from one of its salts by precipitation with a base. Cinchonine, under the same circumstances, likewise appears amorphous. But, on adding a drop of a solution of sulphate, oxalate, or phosphate of ammonium to the mixture, almost instantly the quinine is seen to change into crystalline needles of sulphate, oxalate, or phosphate of quinine; while cinchonine remains unaltered. Further details are expected.

Note on Salicylic Acid. J. Williams. (*Pharm. Journ.*, 3rd

series, viii., 785.) The author comes to the conclusion that the commercial acid, as prepared by Kolbe's process, is contaminated with an acid differing from salicylic. After saturating a boiling solution of salicylic acid with calcium carbonate, and removing the first crop of crystallized calcium salicylate formed, the remaining mother-liquor finally yields an acid in silvery plates. The nature of this body is under investigation.

Nitrate of Pilocarpine. (*Répert. de Pharm.*, Aug. 25, 1877. From *Amer. Journ. Pharm.*) This substance is obtained in white lamellate crystals by percolating powdered jaborandi leaves with alcohol of 80 per cent. containing 8 grams of hydrochloric acid per litre; the tincture is distilled, the extract dissolved in water, filtered, rendered alkaline by ammonia, and repeatedly agitated with chloroform. The solvent is distilled off, the alkaloid exactly neutralized with nitric acid, the liquid filtered, evaporated, and crystallized. The crystals are washed in a cylindrical percolator, with cold absolute alcohol to remove colouring matter, and recrystallized from boiling alcohol in the presence of some granular animal charcoal. The filtrate yields beautiful white crystals (about 5 grams for 1000 grams of the leaves), which are soluble in eight parts of water at 15° C., in seven parts of boiling absolute alcohol, and but sparingly soluble in the latter liquid when cold.

Test for the Purity of Commercial Sulphate of Quinidine. Dr. de Vrij. (*Pharm. Journ.*, 3rd series, viii., 745.) The test for the purity of this salt is based on the comparative insolubility of hydriodate of quinidine in cold water. Dissolve one part of the sulphate in fifty parts of hot water, and add to this solution half a part of iodide of potassium. If the precipitate thus formed is not sandy, but resinous, no further trouble need be taken; for this resinous aspect proves that the salt contains either cinchonine or cinchonidine, or perhaps both of them. If, however, the precipitate constitutes a heavy, sandy, crystalline powder, the filtered liquid is after some hours tested by liquor ammoniæ. If this addition makes the liquor only slightly turbid, *without formation of an appreciable precipitate*, the conclusion is that the salt is really good sulphate of quinidine, and contains only traces of other cinchona alkaloids, which generally is a slight trace of cinchonine.

Pure crystallized sulphate of quinidine contains two molecules of water of crystallization = 4·603 per cent., which it loses so readily that the commercial preparation, as a rule, is found to be nearly anhydrous.

A Delicate Test for Copper. L. Cresti. (*Ber. der deutsch.*

chem.-Ges., x., 240.) A zinc-platinum element is formed of two thin wires, and placed in the solution to be tested. Should much copper be present, the platinum becomes almost immediately covered with a blackish deposit; but if the solution be very dilute, it is necessary to leave the wires in for some hours, after which the platinum will be but slightly, if at all, coloured. The platinum wire is now removed, washed with water, and without previous drying exposed for a few moments to the action of hydrobromic acid and bromine vapour, obtained by heating a small quantity of potassium bromide with strong sulphuric acid. The deposit thus assumes a deep violet colour, which may be more easily recognised by rubbing the platinum wire upon a piece of porcelain. The author believes the colour to be due to bromide of copper dissolved in hydrobromic acid, and states that 0·000001 gram Cu can be readily detected in this manner.

Mr. R. C. Woodcock draws attention to this test in the *Chemical News* of November 30, 1877, p. 241, and states that he has repeated the experiment by dissolving metallic copper in nitric acid, and then diluting the solution until 8 c.c. contained 0·0000008 gram Cu. 8 c.c. were then taken, and a drop of dilute hydrochloric acid added, the zinc-platinum element placed in the solution, and left for nineteen hours, after which time the copper could still be detected by applying the above test.

Glycyrrhizin. J. Habermann. (*Ber. der deutsch. chem.-Ges.*, x., 870.) Commercial glycyrrhizin may be purified by recrystallization from glacial acetic acid. Thus prepared it forms hemispherical aggregations of microscopically small needles, which are soluble in water and in rectified spirit, but less soluble in absolute alcohol, almost insoluble in ether, and have an intensely sweet taste. Its alcoholic solutions form precipitates with calcium chloride and lead acetate. When boiled with weak solution of sulphuric acid a fawn-coloured resinous precipitate is formed, possessing the characteristic sweet taste of glycyrrhizin.

Notes on Copaiba. J. M. Fulton. (*Amer. Journ. Pharm.*, 1877, 550.) The author reports having examined seven commercial specimens of copaiba which he found free from the adulterations sometimes met with in this drug, such as turpentine, gurjun balsam, castor and other fixed oils. The first two mentioned in the table below were incompletely soluble in a small quantity of absolute alcohol, the remainder dissolved readily therein. On being boiled with water, the first four left as residues a hard, the others a more soft resin. The other results are tabulated as follows :—

	31 grams yielded on distillation.			Number of drops in		Drops of vol. oil in 20 drops Copaiba	Solidified with Magnesia.
Sp. gr.	Vol. oil.	Resin.	Loss.	30 c.c.	1 gram.		
·937	21·7	8·5	·8	912	22	$22\frac{1}{3}$	not.
·938	20	8·7	2·3	880	22	$20\frac{2}{3}$	not.
·950	17	12·7	1·3	832	21	$18\frac{1}{3}$	in 10 days.
·950	17·5	12·8	·7	816	20	$19\frac{2}{3}$	,, 12 ,,
·957	11	18·5	1·5	744	20	$12\frac{1}{2}$	,, 3 ,,
·960	9·3	20	1·5	720	19	$12\frac{1}{2}$	,, 2 ,,
·970	9	20·3	1·7	680	20	10	,, 2 ,,

The copaiba was dropped from a minim measure; 1 gram of oil of copaiba yields 35 drops.

Examination of Commercial Copaiba. C. A. Bowman. (*Amer. Journ. Pharm.*, August, 1877.) The author discusses the causes of the differences in the appearance of commercial specimens of copaiba, which are due to its being obtained from different species of copaifera, to the probable mixture of the products of different species, and to the loss or oxidation of the volatile oil from exposure. The principal varieties used in the United States are maracaibo and para copaiba, the former of which is thicker than the last. Specimens of both kinds were procured for examination from reliable houses.

Para copaiba yielded a clear solution with a small quantity of absolute alcohol, and a slight flocculent precipitate with a large quantity. With a small proportion of alcohol of sp. gr. ·817, a separation into two layers took place; but with a large amount no separation occurred, and the solution was nearly clear. Alcohol of sp. gr. ·835, gave in all proportions two layers, the lower of which was transparent, the upper cloudy. Agitated with half its bulk of ammonia, a perfectly clear solution was obtained. On evaporating a little on paper, a resinous spot without greasy margin was obtained, and when evaporated in a capsule, a hard resin was left amounting to 44·4 per cent.

The maracaibo copaibas behaved differently: they were cloudy and without flocculent separation with absolute alcohol; milky and without separation with a small proportion of alcohol of sp. gr. ·817; and cloudy with more. They separated into two layers with alcohol of sp. gr. ·835, gave a permanent milky mixture with half the bulk of ammonia, left on paper a resinous stain with a greasy margin, and on evaporation in a capsule a plastic or soft residue.

The para copaiba was then adulterated with, first, 30 per cent. of castor oil; second, with the same amount of linseed oil; and, third,

with 20 to 50 per cent. of Venice turpentine. With these mixtures the following behaviour was observed :—

Tests.	Behaviour of First,	Second,	Third Mixture.
Alcohol, absolute .	Clear solution.	Clear solution.	Clear, with much alcohol flocculent
Alcohol, sp. gr. ·817	Slightly cloudy.	Separation ; upper layer yellow.	Very slight separation.
Alcohol, sp. gr. ·835	Separation when cold.	Separation, hot or cold.	Separation, hot or cold.
Ammonia water, half bulk . . .	Milky with 5 per cent. of oil.	Milky with 5 per cent. of oil ; yellowish.	Clear solution.
Dropped on paper .	Greasy margin.	Yellow greasy margin.	Well defined resin stain.
Boiled with water .	Soft ; with little oil, plastic residue.	Residue soft or plastic.	Hard resin.
Heat	Odour of copaiba, then of burning fat.	Odour of copaiba and of burning fat.	Distinct turpentine odour.
Petroleum benzin, 1 to 4 parts . .	Clear solution, even in the presence of 2 parts of oil to 1 of copaiba.	Clear.	Dense floccules with 4 parts of turpentine.
Petroleum benzin, 10 to 12 parts .	Separation, even with 10 per cent. of oil.		Dense floccules with 4 parts of turpentine.

The oil separated from the first mixture indicates pretty nearly the exact amount of castor oil present, but little remaining dissolved in the benzin. The solution of para copaiba in petroleum benzin was clear until about eight parts of the solvent had been added, when some floccules separated ; the maracaibo balsams gave clear solutions.

The Proximate Principles of Lobelia Inflata. W. H. D. Lewis. (*Pharm. Journ.*, 3rd series, viii., 561.) Proctor, Bastick, and Richardson have published directions for the isolation of lobeline, the active principle of *Lobelia inflata* (*Amer. Journ. Pharm.*, xiii., ix., 98 ; *Pharm. Journ.*, 1st series, x., 270; *Amer. Journ. Pharm.*, 2nd series, iv., 293.) In all these methods there is difficulty in separating the alkaloid from colouring matter; and for this reason the author recommends a process yielding a much purer preparation.

The powdered drug is mixed with purified animal charcoal, and, after moistening with water to which a small quantity of acetic acid has previously been added, it is packed firmly in a percolator, and allowed to macerate for several days. More of the menstruum is then poured on, and the percolation continued as long as the per-

colate possesses any bitterness. The solution is then gently evaporated to the consistency of an extract, triturated with an excess of calcined magnesia, and the filtered liquid agitated with amylic alcohol, which is decanted and allowed to evaporate spontaneously. The lobeline may be further purified by dissolving in water, and filtering through animal charcoal. In this case the alkaloid is retained in the charcoal, from which it may be removed by ether or amylic alcohol. Sulphuric acid may be used in the place of acetic; but, as the latter forms a salt more soluble in water than any other, it is to be preferred.

Lobeline, as obtained by either of these methods, is of a light yellow colour, and the consistency of honey. It has a strong alkaline reaction, and forms crystallizable salts with acids (not acetic), but is itself uncrystallizable, in this respect differing from hyoscyamine. Caustic alkalies decompose it readily, hence it cannot be prepared from the plant by the ordinary methods of obtaining the non-volatile alkaloids; neither can it be separated by distillation, as conine and nicotine. It has a somewhat aromatic odour, and a sharp acrid taste. It is lighter than water, but dissolves in it with a yellow colour. It is also soluble in alcohol, chloroform, ether, benzol, petroleum naphtha, amylic alcohol, bisulphide of carbon, and many fixed and volatile oils. Petroleum naphtha dissolves it sparingly, and amylic alcohol freely from acid solution. Solutions of the fixed and volatile alkalies dissolve it with more or less decomposition.

With nitric and hydrochloric acids it forms yellow solutions. Sulphuric acid decomposes it with the formation of a red-brown colour, which is intensified on the addition of a fragment of bichromate of potassium. Fröhde's reagent reacts the same as sulphuric acid. On exposure to air lobeline slowly resinifies. In aqueous solution, it is precipitated reddish brown by solution of iodine in potassic iodide, and white by tannic acid, the latter precipitate being soluble in ammonia and excess of the precipitant. Potassio-mercuric-iodide gives a pale yellow precipitate, slightly soluble in excess; and nitrate of silver a white precipitate, soluble in ammonia and nitric acid. Chloride of gold produces a pale yellow precipitate, insoluble in hydrochloric acid. Acetate of lead throws down a white crystalline precipitate. Perchloride of platinum gives a yellow precipitate, which floats on the surface of water, and is slightly soluble in it. Sulphate of iron precipitates it brown. Mercuric chloride does not affect the solution. Gallic acid produces no change. Albumen is not coagulated. Ammonia gives a white precipitate; metatungstic

and picric acids also produce precipitates. On the addition of phosphomolybdic acid a yellowish white precipitate results, which on the addition of ammonia changes to blue, dissolving on continued addition with a faint blue colour, which gradually fades away. This solution is unchanged by boiling. Contrary to Richardson's assertion, the author finds that lobeline, on boiling with dilute solution of sulphuric acid, yields glucose. Dilute potassic hydrate may be used in the place of the acid with the same result. Lobeline is also decomposed when heated at 212° F., unless in combination with an acid.

The peculiar acid in the drug, called *lobelic acid* by Pereira ("A Treatise on Materia Medica," ii., 584), was examined more in detail by Proctor, who, in 1836, had mistaken it for gallic acid. It may be best prepared by adding a solution of sulphate of copper to the decoction of the drug as long as a precipitate falls, washing the precipitate on a filter, suspending it in water, and passing in sulphuretted hydrogen until the mixture becomes of a uniform deep brown hue. The solution is then gently heated, and the cupric sulphide formed removed by filtration. The filtrate is now carefully evaporated, and from the residue thus obtained the lobelic acid is extracted with boiling ether. On evaporation of the ether, a yellow crystalline mass is obtained, having a decided acid reaction. By dissolving in cold ether and evaporating, the acid is obtained in small acicular crystals.

Lobelic acid is soluble in water, alcohol, and ether, and is non-volatile. Its aqueous solution is precipitated green by sulphate of copper, the precipitate being soluble in acetic acid and the alkalies. Ferric chloride produces a brown precipitate, but slightly soluble in acids or alkalies. Acetate of lead gives a copious yellow precipitate; nitrate of silver a white precipitate, becoming of a red-brown colour on standing. Mercuric nitrate gives a dirty white precipitate, while chloride of barium produces no change in the solution.

The decoction obtained by boiling two ounces of the drug in a pint of water for half an hour and filtering, has a reddish brown colour. It is rendered slightly turbid on the addition of alcohol; becomes brown, then yellow, when treated with ammonia; yellow, then red, when sulphuric acid is added, and is not turned blue by iodine. On the addition of the metals mentioned under lobelic acid, precipitates are obtained of a darker colour than those obtained with a solution of the pure acid.

Lobeline exists in the plant as a salt of lobelic acid,—the *lobeliate of lobeline*. It was prepared by Proctor, and by the author, by mixing aqueous solutions of the two principles, concentrating

slightly, and allowing the salt to crystallize out, it being but moderately soluble in water. On boiling it is decomposed, and on treating with alkalies or acids the lobeline undergoes the glucose fermentation. The acrid principle of the drug, called *lobelacrin* by Enders, and described by him in Flückiger and Hanbury's "Pharmacographia," 357–9, is clearly proved by the author's experiments (the details of which will be found in the original article) to be the substance just mentioned, viz., "lobeliate of lobeline."

The substance known as *lobelün*, isolated and described by Reinsch (*Pharmaceutisches Centralblatt*, No. 31, July 5, 1843), and supposed by him to be the active principle of the plant, is, in the author's opinion, a very indefinite compound, containing lobeline, lobelic acid, and much indeterminate matter.

In 1840 Pereira announced the existence in lobelia of a volatile acrid principle (oil?) called *lobelianin*, a peculiar acid, resin, gum, etc. Water distilled from lobelia is asserted to possess the peculiar smell and nauseous acrid taste of the plant. In one experiment he obtained a film of what appeared to be a solid volatile oil. Proctor, however, from an extended course of experiments finds the distillate to be entirely without the acrid taste of the herb. The author found the light brown liquid which comes over when the herb is distilled with water to have the odour of lobelia somewhat intensified, but nothing that could be said to approach the characteristic taste of the plant. On the addition of sulphuric acid it was turned darker. Ferric chloride also darkened it without causing a precipitate. Tannic acid produced no change. Phosphomolybdic acid gave a yellow precipitate which dissolved with a green colour in ammonium hydrate, the solutions becoming yellow on boiling. According to Reinsch (*loc. cit.*), the odour of the plant is due to an indeterminate amount of volatile oil, having a bland taste and pungent odour. The aqueous distillate undoubtedly contains most of this oil, together with indeterminate matter resulting from the decomposition of the lobeline.

The substance isolated by Colhoun (*Journ. of Philadelphia College of Pharmacy*, Jan., 1834), as the active principle of the drug, and called by him *lobelia*, has since been shown by Proctor to be the hydrochlorate of lobeline.

The so-called "mucous gum" and "vegetable gluten" of Reinsch, obtained respectively from the decoction and tincture of the plant, as well as the "resin" mentioned by Pereira, were prepared, but were not deemed of sufficient importance to justify extended investigation.

Adulterated Sulphate of Morphine. D. B. Dott. (*Pharm. Journ.*, 3rd series, viii., 83.) The author has met with a sample of this salt offered in the English market, which contained only 65·37 per cent. of the pure salt, the remainder—34·63 per cent.—being anhydrous sodium sulphate.

Experiments with Husemann's Test for Morphine. A. B. Prescott. (*Amer. Journ. Pharm.*, 1877, 490.) The test is as follows:—When morphine or one of its salts is exposed to the action of concentrated sulphuric acid for twelve to fifteen hours at the ordinary temperature, or for half an hour at 100° C., or for a very short time at 150° C., there occurs (after cooling) a faint violet-red colour. If now (to the cooled solution) there be added a drop of nitric acid, or chlorine water, or ferric chloride solution, or solution of chlorinated soda or chlorinated lime, or a fragment of potassium nitrate or potassium chlorate, a beautiful blue- or violet-red is produced, which passes into a dark red. The one-hundredth part of a milligram of morphine enables this colour to appear with distinctness.—Husemann's "Pflanzenstoffe," 1871, 124. See also *Year-Book of Pharmacy*, 1876, 135.

The sulphuric acid used in Mr. Prescott's experiments was completely freed from nitric acid and oxides of nitrogen by evaporating it to less than half its bulk with a minute quantity of ammonium sulphate. The morphine was purified by washing the finely powdered pure alkaloid of commerce, first with chloroform, and then with ether.

On treating purified morphine with the purified sulphuric acid at 100° C. for half an hour, a pinkish red colour was in each case produced. The least quantity of morphine giving the reaction distinctly was found to be one-fifteenth of a milligram (0·000064 gram, or one-thousandth of a grain).

In each case, after treatment with sulphuric acid at 100° C. for half an hour, and cooling, the addition of a drop of nitric acid gave a beautiful blue to violet red colour, soon changing to an orange and dark red colour, from which the orange faded out. This test (Husemann's) is certainly more distinctive than the test by hot sulphuric acid alone, but its delicacy is only a little greater. In the author's experiments the colour was not obtained with quantities quite so small as those reported by Husemann, but the reaction appeared distinctly in each trial with one-eighteenth of a milligram (0·000051 gram, or one-twelve-hundredth of a grain) of morphine.

Narcotine, with hot concentrated sulphuric acid alone, gave the same reactions as morphine. In Husemann's test, the colour given

by narcotine was bright pinkish red or carmine, the limit being found at about one-fifteenth of a milligram of the alkaloid. *Codeine*, treated with pure sulphuric acid at 100° C., gave a bluish purple colour. The addition of a drop of nitric acid (after cooling) caused a slight change, the colour being blue to violet-red (coinciding with that of morphine). *Narceine* was found to give very little colour, either with sulphuric acid at 100° C. or with Husemann's test. *Brucine*, with concentrated sulphuric acid, even in the cold, gives a light red colour. This fact must be borne in mind in testing for nitric acid by brucia.

The colour was obtained alike in each sample of purified sulphuric acid used in these experiments, the test being made to settle a doubt whether the reaction produced with sulphuric acid and brucine could be due at all to any trace of nitric acid. The colour of brucine with sulphuric acid, on warming and treating with stannous chloride solution, undergoes no other change than a gradual fading toward the yellow, but in presence of nitric acid (as is well known) the stannous chloride develops an intense purple.

Solubility of some Organic Acids. E. Bourgoin. (*Journ. de Pharm. et de Chim.*, 1878, 173–179.) The following table shows the solubility, as determined by the author, of the principal organic acids used in pharmacy, in pure ether, absolute alcohol, and alcohol of 90 per cent. :—

Acid.	Pure Ether.	Absolute Alcohol.	Alcohol of 90 per cent.
Benzoic . . .	31·35	46·68	41·62
Citric	2·26	75·90	52·85
Gallic	2·56	38·79	23·31
Oxalic	1·266	23·73	14·70
Salicylic . . .	50·47	49·63	42·00
Succinic . . .	1·265	7·51	12·59
Tartaric . . .	0·400	25·604	41·135

Quiniretin. Prof. F. A. Flückiger. (*Pharm. Journ.*, 3rd series, viii., 885.) The paper deals with the effect of sunlight on solutions of quinine, and the interesting information it conveys seems to throw some light on the injurious influence which sunlight has been observed by Carles, Broughton, and others to exercise on quinine-yielding barks.

2000 parts of water at 70° C. dissolve a little more than 1 part of quinine, yielding a clear solution which remains colourless and clear for any length of time, provided it be kept in the dark or in dispersed daylight, in closed or in open phials. But on exposure to

sunlight, in July or August, for a few hours, the liquid turns yellowish or brownish, the coloration being developed uniformly in the whole solution, not beginning at the surface. By and by it becomes turbid, and after a few days a flocculent brown matter sinks down, amounting when dry to nearly the quantity of quinine originally employed. A trace of it remains in solution, for the latter remains brownish, and has always a bitter taste reminding of quinine. Yet in the clear solution the alkaloid is present in so trifling an amount that the brown liquid becomes but very faintly turbid on addition of either tannic acid or iodohydrargyrate of iodide of potassium. The transformation of quinine into the brown flocculent substance is due to the effect of sunlight exclusively, and is in no way dependent on the presence of air or oxygen.

The brown substance, which the author calls quiniretin, has still the same composition as quinine, but it is modified in an extremely remarkable way; it is neither quinine nor quinicine, nor does it contain a trace of either. Quiniretin is devoid of an alkaline reaction, insoluble in both alcohol and ether, as well as in hot or cold water; softening but a little in boiling water. It is not fusible unless heated to far above the melting point of quinine, when it undergoes a thorough decomposition.

Quiniretin is dissolved by acids, but unable to neutralize them or to combine with them. It is abundantly soluble in hydrochloric acid, 1·11 sp. gr.; this solution displays an intensely brown colour, and may be diluted with water without becoming turbid. Its very bitter taste reminds of that of quinine, but it is at the same time somewhat aromatic. The hydrochloric solution of quiniretin is not precipitated by tannic acid, thus affording a further proof that this substance is not an alkaloid. The solution is precipitated, on the other hand, as soon as it is neutralized by ammonia; yet quiniretin is not dissolved by an excess of the latter, and in this respect too it differs from quinicine.

It must be granted that the iodohydrargyrate of potassium (1·35 per cent. of bichloride of mercury, 5 of iodide of potassium, and 100 of water) yields an abundant precipitate in the hydrochloric solution of quiniretin; but the same may be said with regard to some other salts, as for instance, chloride of ammonium.

A small quantity of dilute sulphuric acid (1·112 sp. gr.) gently warmed and shaken for a day or two with a large excess of quiniretin affords always an acid liquid of a yellowish hue, far less coloured than the hydrochloric solution. The former is not fluorescent and is decolorized by chlorine water. On addition of ammonia the

latter assumes a dingy green hue, or yields a greenish precipitate; these reactions succeed better if quiniretin is immediately dissolved in chlorine water (it will usually contain an appropriate amount of hydrochloric acid), and ammonia added to it. This behaviour agrees with that of quinine, quinicine, and quinidine (conquinine); yet quiniretin again differs from these three alkaloids, inasmuch as it does not afford that red tar (Grahe's test) which makes its appearance if barks containing quinine—or the allied alkaloids, or certain salts of them—are heated in a glass tube. The other alkaloids of cinchona are much less affected by sunlight than quinine, at least in aqueous solution. This no doubt depends upon their sparing solubility, quinine being more readily dissolved by water. It is interesting to see how little kinic acid is altered by sunlight; saturated or diluted aqueous solution of it was but almost imperceptibly affected after a summer's stay in the sunshine. As to quinovin, there was an absolute absence of any coloration after similar treatment.

Aqueous solution of morphine is very slightly coloured by sunlight, solution of codeine very much; solution of strychnine is scarcely altered, that of brucine turns brown. It is evident that the amount of solubility is of prominent importance in these experiments, codeine as well as brucine being much more abundantly soluble than morphine and strychnine. The author suggests that further experiments relating to these remarkable effects of sunshine should be simultaneously instituted by means of other solvents than water. His own experiments were made with pure quinine, not with its salts, which have been examined by others. The absence of acids seems to prevent the formation of quinicine.

Micro-chemical Identification of Tea Leaves. A. W. Blyth. (*Amer. Journ. Pharm.*, 1877, 456, from the *Analyst.*) The author's experiments have resulted in the establishment of a very simple process, enabling any one in a few minutes to pronounce whether the merest fragment of a leaf or plant belongs to the theine class or not. The details of the process are as follows:—

1. The leaf or fragment, if it is desired to examine it subsequently by the microscope, is boiled in a very small quantity of water, say a cubic centimeter, the decoction transferred to a watch glass, a minute quantity of calcined magnesia added, and the whole evaporated nearly to dryness on the water bath; the extract is next transferred to the surface of a thin circular disc of microscopic covering glass; upon this is placed a thickish ring of glass, which is covered with a second circular disc of thin glass, the whole forming what the author styles, "the subliming cell." The

subliming cell is placed on the surface of an iron plate, which carries a cup of mercury in which is inserted a thermometer, and the plate is fitted in the ordinary way to a retort stand. This method of sublimation, in all its essential features, is identical with the one proposed and employed years ago by Dr. Guy. On heating the iron plate, first, moisture is given off and condenses on the cover of the subliming cell, and this cover may be removed and replaced by a second. In a very short time after it has become dry, a light mist is seen on the upper disc, and this mist the microscope resolves into beautifully distinct little crystals of theine, which may be identified as such by resubliming, when they will be found to rise to the upper disc at about a temperature of 101° C. The subliming temperature of the extract itself is rather variable; the extract should be heated, if no mist or crystals become visible, up to as high as 220° C., and if still no crystals are obtained, the substance most certainly contains no theine. The author always obtained a sublimate from genuine products derived from tea or coffee below 200° C.

2. The substance is boiled and treated with magnesia as before, the solution cooled, a bit of dialysing parchment folded and cut into a miniature filter form, and placed in a glass tube, which, as very small quantities are being dealt with, need be no bigger than a thimble, or a porcelain crucible may be used, which being always at hand will, perhaps, be more convenient than anything else. The solution is then by means of this little apparatus dialysed for twelve hours, after which the yellow colouring matter and theine will be found in the outer liquid, and a microscopic examination of the residue left upon evaporation of this liquid will readily discover crystals of theine. As in the former case, the fragments of the leaf or the leaf itself are uninjured, and can be put to any supplementary examination desired.

3. The leaf is boiled for a minute or two in a watch glass, with a very small quantity of water, a portion of magnesia equal in bulk is added, and the whole heated to boiling, and rapidly evaporated down to a good sized drop; this drop, containing a yellow colouring matter, magnesia and theine, is poured on to one of the thin discs of glass already mentioned, and then evaporated nearly to dryness on the subliming plate. When it approaches dryness the "subliming cell" is completed by the circle of glass and cover, and in this way a sublimate is readily obtained. If the substance is derived from a theine-producing plant, a distinct sublimate of theine will be the result. The leaves, etc., of the tea plant also yield, without any

preparation whatever, scanty sublimates of theine, and coffee gives up a very large proportion of the alkaloid, below 110° C., but at all events, in the case of tea it is preferable to operate with magnesia as described. The author thinks that a great many leaves in the vegetable kingdom will yield, by appropriate treatment, microchemical evidence as definite as that of tea, and the time may come when a large proportion of minute vegetable products will be identified, not alone by the shape of their stomata, their epidermal appendages, or the structure of their ultimate vesicles, but by isolating their acids, their glucosides, or their alkaloids, and evolving a microscopical *corpus delicti* from a milligram of crude material.

There is yet another micro-chemical test which belongs to pyrology; and that is the presence of manganese in the ash of tea. The ash of a single leaf will give a distinct green manganate of soda bead, and so will the ash of a great many other leaves; but since the author has not found any tea leaf without manganese, he considers that a leaf in tea which does not respond to this test affords conclusive evidence of its being a foreign leaf.

Quantitative Determination of Theine. A. W. Blyth. (*Amer. Journ. Pharm.*, 1877, 458, from the *Analyst.*) The observation of the ease and purity with which theine sublimes, led the author to work out a quantitative method of sublimation.

A quantity not less than one gram, or more than two grams, of either tea or coffee, in its undried state, is as finely powdered as possible, and treated in a flask with 70 c.c. of water; the flask is attached to a reversed Liebig's condenser, and the liquid boiled for one hour; the docoction, including the powered substance, is transferred to a porcelain dish; about the same weight of calcined magnesia as the substance originally taken is added, and the whole evaporated down nearly to dryness; the powdery extract is now transferred to the iron subliming plate mentioned in the foregoing article, and covered with a tared glass funnel, the edge of which must be accurately ground, and the tube of which must be several inches long. The substance should form a very thin equal layer within the circle of the funnel, which may be easily accomplished by a series of gentle taps. The heat at first should not exceed 110° C., then, when the substance appears thoroughly dry, it may be gradually raised to 200° C., and towards the latter stages to 220° C. If the heating has been properly regulated, there will be no distillation of empyreumatic products, but the alkaloid sublimes in the cool part of the funnel, in a compact coating, cone-shaped, of beautifully white silky crystals. In order to ascertain when the sublimation

is complete, the tared funnel may be cooled and weighed at intervals, or a series of tared funnels may be kept on hand and changed until no more theine is extracted. The funnel as well as the theine at the end of the process is perfectly dry, and the increase of weight is theine pure and simple. By the method described the author made numerous determinations of theine, and afterwards digested the powder remaining for twenty-four hours in ether, but failed to obtain any crystalline product; he therefore believes that the whole of the alkaloid is sublimed, and that the results, if due care be used, are accurate. The process is also well adapted for working on a large scale, and if ever there should be any great demand for the alkaloid, it might be advantageously employed for its preparation.

Extraction and Estimation of Piperin in Pepper. MM. Cazeneuve and Caillol. (*Bull. Soc. Chim.* [2], xxvii., 290.) The authors extract piperin by boiling the ground pepper with twice its weight of calcium hydrate, and a sufficient quantity of water, for a quarter of an hour, then evaporating the solution to dryness on a water bath, and exhausting the residue with ether. On evaporating the ethereal solution and drying the residue at 100° C., piperin is left in a sufficiently pure state for weighing. By re-crystallizing it from alcohol, it is obtained in large crystals of a faint straw-yellow colour, which are perfectly pure. About 10 grams of pepper are used for each determination.

The following are the results obtained by means of this process:—

Sumatra Pepper . .	gave 8·1	per cent.	piperin.
Black Singapore Pepper	,, 7·15	,,	,,
White ,, ,,	,, 9·15	,,	,,
Penang Pepper . .	,, 5·24	,,	,,

A New Method for the Quantitative Determination of Sugar in Blood. F. W. Pavy. (*Proc. Royal Soc.*, xxvi., 314, 346.) The author considers Bernard's volumetric process for the estimation of sugar in blood by means of Fehling's solution, as untrustworthy, because the volume of the trial liquid varies with the amount of solid matter in the blood, and with the loss by evaporation during the separation of the coagulum by heat; and also because the organic matter interferes to some extent with the precipitation of the cuprous oxide. In the place of this method he proposes a gravimetric process, the leading features of which are the following:—

The blood is mixed with sodium sulphate, boiled to remove albuminous and colouring matters, then filtered, and the filtrate boiled with an excess of solution of potassio-tartrate of copper. The pre-

cipitated sub-oxide is collected, then oxidized by a few drops of peroxide of hydrogen, and the resulting cupric oxide dissolved in nitric acid. From the solution the copper is electrolytically deposited on a platinum spiral, and weighed. Minute details of the process will be found in the original paper. The blood to be analysed must be collected either during life, or immediately after death, and must be analysed as soon as possible after collection, as the amount of sugar rapidly decreases. If allowed to stand for twenty-four hours, more than half of the sugar will have disappeared.

The average amount of sugar naturally present in the blood of bullocks was found to be ·054; that in the blood of sheep, ·052; and that in dogs' blood, ·078 per cent.

From the author's experiments there appears to be virtually no difference between the amounts of sugar in arterial and venous blood respectively, an observation which is in direct opposition to the conclusions arrived at by Bernard.

Pelletierine, an Alkaloid of Pomegranate Bark. M. Tanret. (*Comptes Rendus*, xxxv., 1270; *Pharm. Journ.*, 3rd series, viii., 1023.) The author has succeeded in isolating from the bark of *Punica Granatum*, a volatile alkaloid, which, in honour of Pelletier, he proposes to call "pelletierine."

In preparing pelletierine, pomegranate bark (from the stem and roots) is reduced to a coarse powder; this is moistened with tolerably thick milk of lime, and afterwards lixiviated with water, and the liquor vigorously shaken up several times with chloroform. The chloroform is then separated by means of a funnel having a stopcock, and shaken with sufficient acid to render it neutral or slightly acid. In this way solutions of sulphate, hydrochlorate, nitrate, etc., of pelletierine, can be obtained, which may be crystallized by evaporation in a vacuum over sulphuric acid. To isolate the alkaloid, it may be set free by treating the saline solutions with carbonate of potash and agitating with ether, or, better still, with chloroform. The ethereal or chloroform solution then being distilled at a gentle heat, the alkali is left as a residue.

One kilogramme of dry commercial bark yielded to the author by this process four grains of crystallized pelletierine sulphate. With fresh bark the yield would probably be greater. Pelletierine is of an oleaginous consistence, and is colourless when obtained by evaporation of its ethereal or chloroformic solution in a vacuum; but when the solution is distilled in the open air the alkaloid becomes slightly yellow. It is volatile, and has a slightly stupefying aromatic odour. It gives off vapour at the ordinary temperature, and the oil

spots it forms on paper disappear after exposure to the air for a short time. It boils at about 180° C., becoming strongly coloured in the air, but it commences to distil at a much lower point. The alkaloid is very soluble in water, alcohol, ether, and especially in chloroform, which readily removes it from aqueous solutions.

Pelletierine acts as a powerful alkali, saturating acids to form salts. Upon bringing near to it a rod dipped in hydrochloric acid white fumes are formed, as with ammonia. It does not precipitate solutions of the metals of the earths and alkaline earths, but it does precipitate solutions of most of the heavy metals. Thus it gives a white precipitate with salts of lead, mercury, zinc, and silver; the last two being re-dissolved in excess of pelletierine. With muriate of cobalt and with sulphate of copper it gives blue precipitates, which are not re-dissolved in excess. It does not precipitate chloride of platinum, but it precipitates the chlorides of palladium and of gold; the last precipitate being reduced by heat. Further, like other alkaloids, it is precipitated by tannin, bromine water, iodo-iodide of potassium, iodide of mercury and potassium, iodide of potassium and cadmium, and phosphomolybdic acid. The precipitate formed with tannin is soluble in an excess of the reagent; that formed with bromine water is soluble in an excess of pelletierine.

The author has prepared the sulphate, hydrochlorate, and nitrate of pelletierine in crystals. These salts are extremely hygroscopic. Obtained by evaporation of their solutions in a dry vacuum they are colourless. If the neutral solutions are evaporated in a stove they become coloured yellow, and at the same time by loss of part of the base they acquire an acid reaction. The salts have a slight odour, and their taste is bitter and aromatic.

Detection of Bismuth by Von Kobell's Test. W. M. Hutchings. (*Chem. News*, Dec. 7th, 1877.) Von Kobell's test is based upon the formation of red iodide of bismuth, and is performed by mixing a solid bismuth compound, or the substance suspected to contain bismuth, with equal parts of iodide of potassium and sulphur, and heating on charcoal before the blowpipe. A red sublimate indicates bismuth. The author suggests the substitution of cuprous iodide for the potassium iodide, as the mixture with sulphur does not deliquesce, and the red sublimate of bismuth is not liable to be masked by a white sublimate, such as is given off when iodide of potassium is used. An aluminium plate is preferable to one of charcoal, as the faintest trace of the brownish red bismuth is very conspicuous on it.

A Delicate Test for Bismuth. Prof. F. Field. (*Chem. News*, Dec. 14th, 1877.) The author calls attention to the delicacy of a test for

bismuth devised by Prof. Abel and himself. The test is based upon a curious reaction exhibited by iodide of potassium in the presence of lead and bismuth. When iodide of potassium is added to a lead solution, iodide of lead is precipitated yellow, which re-dissolves on heating, and crystallizes again on cooling in brilliant golden yellow scales. If the least trace of bismuth is present, the precipitated scales are no longer yellow, but assume a dark orange or crimson tint, varying with the amount of bismuth present. The test is of such delicacy that ·00025 gram of bismuth can easily be distinguished, the oxide of lead becoming dark orange; ·001 gram gives a reddish brown tint, or a bright crimson, resembling in appearance chromate of silver.

Note on the Detection of Bismuth. F. Savory and H. G. Greenish. (*Pharm. Journ.*, 3rd series, viii., 691.) The authors have tested the delicacy of a reaction devised by Prof. F. Field and by Prof. Abel, described in the *Chemical News* of Dec. 14th, 1877. (See the foregoing article.)

The test liquid may be conveniently prepared by adding to a boiling solution of acetate of lead—containing about half a gram to the ounce—solution of iodide of potassium in considerable excess. The re-solution of the iodide of lead at first precipitated is materially assisted by the addition of acetic acid. On cooling, iodide of lead is deposited in the characteristic brilliant scales.

A small quantity of this test liquid, including both supernatant liquid and precipitated scales, is transferred to a test tube, and gradually heated till solution takes place. The liquid to be tested is then added, and the whole allowed to cool. The separated scales will show a distinct change in colour if the smallest quantity of bismuth is present.

To test the delicacy of the reaction one grain of oxynitrate of bismuth was dissolved in a litre of water, with the addition of nitric acid. Each cubic centimetre would contain one milligram of oxynitrate. A second, more dilute solution, was prepared, each cubic centimetre of which contained one-tenth of a milligram of oxynitrate.

5 c.c. of the test liquid were heated in a test tube till clear. 1 c.c. of the strong solution (1 milligram of oxynitrate) was added. The precipitated scales were dark in colour.

5 c.c. of the test liquid, with $\frac{1}{10}$ c.c. of the strong solution ($\frac{1}{10}$ milligram of oxynitrate), gave a very decided change in colour.

A blank experiment gave the iodide of lead in the usual characteristic yellow.

As the quantity of iodide of lead, present would evidently affect the delicacy of the reaction, a smaller quantity of the test liquid was next used, and the dilute solution of oxynitrate employed.

One-half c.c. of test liquid, with 1 c.c. of the dilute solution ($\frac{1}{10}$ milligram of oxynitrate), gave a very decided reaction.

One-half c.c. of test liquid, with $\frac{1}{10}$ c.c. of dilute solution ($\frac{1}{100}$ of a milligram of oxynitrate), gave a distinct change in colour. Much hydrochloric or nitric acid must be avoided; but boiling the precipitated scales with acetic acid appeared to heighten the delicacy. 5 c.c. of test liquid ($\frac{1}{50}$ milligram oxynitrate), boiled with strong acetic acid and cooled, gave a distinct change in colour; $\frac{1}{100}$ milligram was also evident. By means of this test small quantities of bismuth may be detected with ease in the presence of lead, without the trouble of removing the latter. If the precipitated hydrates of lead and bismuth be dissolved in acetic acid, and a portion of the solution be added to the test liquid in the usual manner, an indication of the presence or absence of bismuth will be speedily obtained. The lead may then be detected in the remainder in the usual manner.

Some New Reactions for Alkaloids. Dr. R. Godeffroy. (*Archiv der Pharmacie* [3], ix., 434–440; *Journ. Chem. Soc.*, 1877, 365.) The difficulty with which alkaloids, especially if present in small quantities, are detected in chemico-legal investigations, is well-known; in fact, no ready method of separation has yet been discovered, so that all communications regarding new reactions for alkaloids are desirable.

Basing his researches on the peculiarity of the fact that most of the known re-agents for alkaloids also produce characteristic precipitates in solutions of alkaline metallic salts (especially salts of calcium and rubidium), the author was led to investigate whether the chlorides of the so-called heavy metals are equally suitable for the formation of difficultly soluble double salts with the alkaloids. The following results were obtained:—

1. A solution of ferric chloride in hydrochloric acid gives yellowish red precipitates in hydrochloric acid solutions of the following alkaloids: aconitine, piperine, strychnine, and veratrine.

In the case of atropine, quinine, and cinchonine, the precipitate formed is soluble in an excess of the precipitant; brucine, caffeine, and morphine are not precipitated.

The precipitate produced by ferric chloride and the alkaloid consists of a double ferric chloride and the hydrochloride of the alkaloid. One molecule of the double salt contains one molecule of ferric

chloride and 2 molecules of the chloride of the alkaloid. This double salt is readily soluble in water and dilute hydrochloric acid.

By treating an aqueous solution of quinine hydrochloride with an aqueous solution of ferric chloride, and evaporating the mixture—avoiding the separation of a basic iron salt by adding a sufficiency of hydrochloric acid—small yellowish red crystals of the double chloride are obtained, exhibiting the form of monoclinic prisms: ∞P with $\infty \breve{P} \infty$, oP and subordinate $\infty \breve{P}n$. The angle OP: $\infty \breve{P} \infty$ is only slightly greater than 90°; so that the crystals approach very near to the rhombic system. Analysis of the crystals lead to the formula $Fe_2 Cl_6 . 2 (C_{20} H_{24} N_2 O_2 . 2H Cl)$. They are readily soluble in water and alcohol, possess a bitter ink-like taste, and can be heated to 100°–120° without being altered.

2. A solution of antimony trichloride in hydrochloric acid produces a precipitate in hydrochloric acid solutions of the following alkaloids: aconitine, quinine, cinchonine, conine, piperine, strychnine, and veratrine. Atropine, nicotine, and solanine are precipitated only from very concentrated solutions; while caffeine and morphine are not precipitated. These precipitates are flocculent and white (the piperine precipitate is yellow), and dissolve readily in dilute hydrochloric acid. Their solutions are decomposed by the addition of water, separating oxychloride of antimony.

For the quinine precipitate the formula $Sb Cb_3 . C_{20} H_{24} N_2 O_2 . 2H Cl$, was obtained. This salt when dried in the air forms a white amorphous powder, not soluble in water without decomposition. It dissolves very easily in dilute hydrochloric acid; less easily in concentrated acid. When heated to 80° it melts and yields on cooling a hard, brittle, yellowish white mass, which may be easily crushed to a fine white powder.

3. A solution of stannous chloride forms precipitates in hydrochloric acid solutions of the following alkaloids: aconitine, atropine, brucine, quinine, cinchonine, conine, morphine, piperine, solanine, strychnine and veratrine. Nicotine is precipitated only from concentrated solutions, and caffeine is not at all precipitated.

The above precipitates produced by stannous chloride are not readily soluble in water, especially in presence of hydrochloric acid: the morphine and quinine salts being the last soluble. The formula $Sn Cl_2 . C_{17} H_{19} N O_3 H Cl$. was obtained from the morphine salt.

By evaporating a solution of caffeine in hydrochloric acid with a solution of stannous chloride, crystals of a double salt are obtained having the following composition: $Sn Cl_2 . C_8 H_{10} N_1 O_2 . H Cl$. At first sight these crystals appear in the form of simple rhombohe-

drons. However, by further investigation, it will be seen that of the three pairs of faces only two pairs are physically unique and have equal plane angles, while the third pair varies in physical properties and plane angles. The crystals show therefore the monoclinic combination, ∞ P. O P.

4. Lanbenheimer obtained precipitates in very dilute solutions of quinine salts by the addition of an aqueous solution of *silico-tungstic acid;* and as this chemist did not investigate this reaction more closely, the author resolved upon extending it for other alkaloids, and obtained results which proved that this acid forms the most sensitive reagent for alkaloids. The sensitiveness of this reaction was specially tested in the case of the hydrochlorides of quinine, cinchonine, and atropine.

An aqueous solution of quinine hydrochloride gave a distinct precipitate, with a few drops of an aqueous solution of silico-tungstic acid, even if the solution contains only 0·004 per cent. of the alkaloid. When 0·002 per cent. was present, a turbidity was still perceptible.

A solution of cinchonine hydrochloride was still rendered turbid by silico-tungstic acid when only 0·0005 per cent., or $\frac{1}{200000}$ of the alkaloid, was present; while a hydrochloric solution of atropine gave a turbidity when only 0·0065 per cent., or $\frac{1}{15385}$ of the alkaloid, was present.

These precipitates, therefore, undoubtedly form the most sensitive reaction for alkaloids. They are more or less difficultly soluble in concentrated hydrochloric acid, are decomposed by caustic alkalies, with separation of the alkaloid and formation of silico-tungstate of the alkali metal. With ammonia they give at first clear solutions, which are afterwards rendered turbid by the separation of silicic acid. By fusing the precipitates, a mixture of silicic acid and tungstic acid is obtained, which is insoluble in water, concentrated hydrochloric acid, and ammonia.

According to Marignac, silico-tungstic acid does not yield difficultly soluble or insoluble compounds with metallic salts, so that this reaction for alkaloids is not affected thereby.

Solubility of the Alkalies in Ether. W. Skey. (*Chem. News*, xxxvi., 48.) The author finds that the caustic alkalies and the monocarbonates are soluble in ether to an appreciable extent, and therefore recommends the use of alkaline bicarbonates in their place for the precipitation of alkaloids in Stas's process.

Volumetric Estimation of Zinc. F. M. Lyte. (*Chem. News*, xxxvi., 89.) The author proposes the following modification of a process previously published by him:—Dissolve in hydrochloric acid.

Let the solution cool, and neutralize with chalk. Add a solution of hypochlorite of lime, enough to peroxidize and precipitate any iron, manganese, copper, lead, cobalt, nickel. Filter, and wash the residue on the filter into a gauged flask. Take a measured sample; add about 5 to 10 per cent. of strong hydrochloric acid. Boil till all free chlorine is expelled, and titrate the boiling solution with potassium ferrocyanide and uranium indicator as before advised.

Davyum, a New Element. S. Kern. (*Chem. News*, xxxvi., 4; *Journ. Chem. Soc.*, 1877, 278.) On the 28th of June, 1877, the author perceived in the residues obtained after the treatment of platinum ores for the separation of the metals of the platinum group, a new metal, which he called "Davyum," in honour of Sir Humphrey Davy. The ores investigated had the following average composition :—

Pt	Ir	Rh	Os	Pd	Fe	Ru	Cu
80·03	9·15	0·61	1·35	1·20	6·45	0·28	1·02 = 100·09 per cent.

This ore was treated by the well-known Bunsen process, and in separating the rhodium and iridium, the presence of davyum was detected. The precipitate formed by the action of hydrogen at 100° was purified by dissolving it in *aqua regia*, and then treating it with chlorine in the presence of barium chloride. Water was added, the barium precipitated and filtered off, and the rhodium and iridium solutions were mixed with a concentrated solution of sodium hyposulphite. In a few days a precipitate of a light yellow colour was obtained, which was the double sulphite of rhodium and sodium. This was filtered off, and the filtrate heated on a sand bath, in order to obtain the irridium double salt. The solution from the irridium precipitate, collected from the treatment of 600 grams of the ore, was concentrated and heated with chloride and nitrate of ammonium in excess, at 60° to 65°, for one hour. A dark red precipitate was formed, which on ignition gave a grey, spongy mass, and when fused by means of the oxyhydrogen blowpipe, gave a silvery ingot of davyum. The weight of the ingot was 0·27 gram. Davyum dissolves readily in aqua regia, very slowly in boiling sulphuric acid. Potash gives a light yellow precipitate. Sulphuretted hydrogen in acid solutions gives a brownish precipitate, which quickly turns black when dried. With sulphocyanate of potassium it gives the same reaction as iron salts. Its specific gravity is 9·385 at 25°. It is extremely infusible, hard, and to some extent ductile. It may be supposed to occupy the place between molybdinum and ruthenium in Mendelejiff's periodic system of elements.

Perhaps davyum is the hypothetical metal in the periodical system having the atomic weight equal to 100.

In a subsequent paper published in the *Chemical News* of Sept. 14, 1877, the author states that the platinum ores contain no more than 0·35 to ·045 per cent. of davyum, and that the atomic weight of this metal is nearer 154 than 100, as originally supposed. Davyum chloride is said to furnish with potassium hydrate a hydrated oxide of the metal, soluble in nitric acid. The author also describes a crystalline double cyanide of davyum and potassium; a sulphide and a crystalline sulphocyanide. The double chloride of davyum and sodium is nearly insoluble in water and alcohol, and this is represented as establishing an important difference between it and the corresponding salts of the platinum group of metals.

In the *Chemical News* of October 5th the author publishes the results of a spectroscopic examination of the new metal. The following lines were distinctly observed :—

FRAUENHOFER'S LINES.

A.	17·3		F.	90·0	
a.	22·6			92·0	Da
	24·3	Da		92·5	
B.	28·0			93·3	
	31·6	Da		93·6	
	32·5			116·5	
C.	34·0			122·0	
	36·6		G.	127·5	
	37·3	Da		135·3	
	40·0			150·0	
D.	50·0			157·0	Da
	53·0			157·5	
	54·5	Da		160·3	
	55·3		H.	162·0	
E.	71·0		H1.	166·0	
b.	75·4				
	84·0	Da			
	84·8				

Reagent for Mineral Acids. (*Zeitschr. des oesterr. Apoth. Ver.*, 1877, No. 29.) If a mixed solution of potassium ferrocyanide and ammonium molybdate be added to any liquid containing a trace of mineral acid (sulphuric, nitric, phosphoric, hydrochloric, arsenic, sulphurous, phosphorus) a red coloration and turbidity is at once produced. If the mineral acid present amounts to more than a

trace, the coloration is brown. The colour and turbidity disappear on the addition of an alkali.

The reaction fails with boracic and arsenious acids.

Solubility of Sulphur in Acetic Acid. L. Liebermann. (*Ber. der deutsch. chem.-Ges.*, x., 866.) The author has observed that sulphur is soluble to a not inconsiderable extent in hot concentrated acetic acid, and crystallizes out upon cooling. Moderately dilute acetic acid dissolves a mere trace of sulphur.

If such solution be mixed with water, the sulphur is precipitated as a fine white powder. On evaporating the solution in vacuo, sulphur separates in prismatic crystals.

Improvement in the Manufacture of Oxalic Acid. E. Bohlig. (*Bayer. Ind. und Gew. Bl.*, 1877–6. From *New Remedies.*) The author has devised an improved process for the preparation of pure oxalic acid, which materially shortens the time, labour, and therefore expense of its manufacture. The first step of this process is identical with that hitherto practised, of which the following is an outline :—

A solution of caustic potash, of 36° Baumé, is heated to boiling in a strong iron boiler, and pine-wood sawdust is added until the mass becomes thick. The heat is continued, and when the water has evaporated, the contents of the boiler soon return to a liquid state, become homogeneous, and assume a turmeric yellow colour. After heating for two to two and a half hours longer, the fire is withdrawn, and the solution allowed to cool a little. Water is then added slowly to the still hot mass, until the density of the solution is 40° B., when it is allowed to become entirely cold. The yield of potassium oxalate, which is completely insoluble in a lye of 40° B., is very large. This product, potassium oxalate, or sodium oxalate, if soda has been used instead of potash, has up to the present time been decomposed by boiling with milk of lime, which must be done in dilute solution. This produces a dilute soda or potassa lye, and a voluminous precipitate containing calcium oxalate and large quantities of calcium carbonate, necessitating the waste of a considerable quantity of sulphuric acid, which must be added not only to decompose the oxalate, but likewise to convert the excess of carbonate into sulphate. The resulting solution of oxalic acid is very dilute, and requires to be concentrated by heat, besides being still impure.

Mr. Bohlig's improvement consists in dissolving the washed and recrystallized potassium oxalate, obtained in the first step of the process, in a large quantity of hot water, and precipitating with a

solution of magnesium chloride or sulphate. The well-washed precipitated magnesium oxalate is heated in a wooden vat by means of a steam coil, and concentrated hydrochloric acid is added, until everything is dissolved. The clarified solution is drawn off, while still hot, into stoneware vessels, and on cooling pure oxalic acid crystallizes, which needs only to be washed and recrystallized to be chemically pure.

Comparative Analyses of Rhubarb. Prof. G. Dragendorff. (*Pharm. Journ.*, 3rd series, viii., 826.) The author's analyses were undertaken with the object of comparing some varieties of rhubarb with one another. Five samples were examined, viz. :—

1. *Rheum Moscoviticum*, imported in 1860, with the last consignment of "crown" rhubarb, and supplied to the author from the crown warehouse in Moscow.

2. *Rheum Chinense*, as this kind occurred in commerce in 1877, and was delivered from the crown warehouse in St. Petersburg.

3. Rhubarb from *Rheum palmatum Tanguticum*.—A sample of the drug brought by Przewalski from Kansu, the origin of which was the subject of a communication by Maximowicz.

4. *Rheum Anglicum cultum*, purchased in Moscow, and corresponding externally with the Rhapontic rhubarb.

5. *A rhubarb cultivated in Siberia*, of a kind formerly used there in the hospitals, etc., and supplied to the author through Dr. Duhmberg, of Irkutsk.

The author describes the process of analysis adopted in examining the Siberian drug, No. 5, giving only the analytical data for the other four, except where any variation was made. The drug was in each case reduced by rubbing upon a fine grater, and the powder was passed through a sieve having 169 meshes to the square centimetre. In the experiment similar quantities, both of the powder and the solvents, were used.

The results are arranged for comparison in a tabular form (see next page).

Full details are given in the original paper of the processes of analysis.

To assist in forming a judgment of the relative value of the rhubarbs examined, the author discusses the question as to which are the active constituents of the drug.

The constituent upon which the purgative properties of rhubarb depend, he considers to be cathartic acid, a glycosoidal nitrogenous substance, possessing the closest resemblance to the active substance occurring in senna leaves and black alder bark.

	No. 1. Rheum Moscoviticum, 1860.	No. 2. Rheum Chinense 1877.	No. 3. Rheum palmatum tanguticum, 1873.	No. 4. Rheum Anglicum, 1866.	No. 5. Rhenm Sibiricum.
Moisture	9·52	11·25	10·35	11·09	8·69
Ash	8·27	6·32	24·05	3·20	10·38
Mucilage, soluble in water	3·35	1·58	1·71	2·55	3·08
Arabic Acid, soluble in water, not precipitated by alcohol	5·82	6·43	3·17	8·32	2·01
Metarabic Acid	3·82	5·70	2·57	3·22	8·47
Pararabin	3·91	2·10	3·54	1·95	3·02
Starch	8·40	6·20	6·32	16·50	11·95
Cellulose	7·45	7·64	4·91	4·29	8·61
Sugar	5·55	4·29	3·94	4·40	3·66
Substance readily soluble in water and in absolute alcohol, probably a carbohydrate	2·70*	6·47	7·41	8·21	1·95
Cathartic Acid	5·25	4·88	2·03	2·50	2·26
Malic Acid, etc.	0·04	1·09	trace	0·17	1·24
Oxalic Acid, combined with calcium	3·28	4·59	4·19	1·12	2·15
Free Chrysophanic Acid, soluble in petroleum spirit	None	trace	trace	distinct trace	1·01
Chrysophan and Tannin	17·13	14·17	8·22	4·83	7·84
Emodin, Erythroretin, Phœoretin, etc.	1·13	1·15	1·18	5·89	6·29
Dark brown Crystalline Resin, etc., soluble in alcohol and in ether	1·00		2·59		
White Crystalline Resin, soluble in ether, insoluble in alcohol	0·15	0·70	0·49	2·32	2·75
Fat	0·05	0·15	0·32	6·17	trace
Albumenoid Substances	4·37	4·39	4·33	3·17	3·92
Paracellulose, Vasculose, Pectose, Lignin, etc.	18·81	10·90	8·68	16·10	10·72
	100·00	100·00	100·00	100·00	100·00

The tonic action of the rhubarb probably finds its principal explanation in the tannic acid present. But the high value rhubarb has in practice is in the third place dependent upon the existence of substances which, like chrysophan, by an easily initiated decomposition yield chrysophanic acid, or, like emodin, erythroretin, phœoretin, etc., standing so near to the latter that their similarity in action might be presumed. But since through the study of araroba, etc., attention has been turned to the strongly antiseptic property of chrysophanic acid, and its power to suppress abnormal decomposition processes in the body, probably it would not be a mistake to

* According to another determination 3·16 per cent.

attribute the frequently surprising action of rhubarb in intestinal catarrh, for the greater part, to the action of these last-mentioned substances.

In respect to the amount of cathartic acid, as well as of tannin and chrysophan, the Moscow "crown rhubarb, No. 1," stands highest among the rhubarbs analysed. If it be considered that the sample examined was already upwards of seventeen years old, and that the easily decomposed cathartic acid would probably during that time have become somewhat diminished, it appears to be subject for regret that the former source of this rhubarb cannot be reopened.

Next to the "crown rhubarb" in respect to the peculiar constituents come the best varieties of *Rheum Chinense* (No. 2) as at present occurring in commerce, and which, so far, may be considered a useful substitute for it.

At a considerably wider interval from it stands the *Rheum palmatum* of Przewalsky (No. 3). In the face of the fact that the better sorts of rhubarb show by their structure that they are derived from the stem, whilst the root of *Rheum palmatum* is used, it is not probable that Przewalsky's rhubarb could be indentified with them, and this opinion is also supported by the chemical analysis. The rhubarb from *R. palmatum*, which was remarkable also for the large amount of ash it yielded, contained only about 40 per. cent. of the amount of cathartic acid present in the crown rhubarb, and about 48 per cent. of the chrysophan and tannin.

In respect to cathartic acid, Przewalsky's rhubarb had no advantage over the cultivated English and Siberian rhubarbs (Nos. 4 and 5), but the English was considerably poorer in chrysophan and tannin. The English and Siberian, probably both derived from *R. Rhaponticum*, contained especially a much higher proportion of starch than the other three, and a smaller proportion of cellulose than the crown and the Chinese, but instead a larger proportion of the brown and crystalline resins. Finally, the English and Siberian samples were characterized by containing free chrysophanic acid, dissolved out by treating it with petroleum spirit, but which was absent from the other three samples. An admixture of the powder of a Rhapontic rhubarb with that of a better class of Chinese rhubarb could therefore be easily detected by exhausting with cold petroleum spirit. Good rhubarb after standing several days would give a colourless extract, whilst one sophisticated with a Rhapontic rhubarb would yield an intense yellow extract.

The Pharmaceutical Group of Atropine. Prof. R. Buchheim.

(*N. Repert. Pharm.*, xxv., 344–358. From *Journ. Chem. Soc.*, August, 1877.) As atropine, when treated with baryta water, decomposes into tropic acid, $C_9 H_{10} O_3$, and tropine, $C_8 H_{15} N O$, it may be viewed as tropine in which the only replaceable atom of hydrogen is replaced by the radicle of tropic acid, thus: $C_8 H_{14} O. N. C_9 H_9 O_2$.

In crude atropine a second base exists of the formula $C_{18} H_{25} N O_4$, called by Hübschmann *belladonnine*. The author obtained a quantity of crude belladonnine, prepared by precipitating atropine sulphate with potassium carbonate till the precipitate was no longer resinous, but a powder. From this syrupy dark brown mass the belladonnine was precipitated by ammonia, well washed with water to remove brown colouring matter, and one-half neutralized with sulphuric acid and added to the rest. From this mixture ether, or better, chloroform, extracted pure belladonnine, leaving atropine and some belladonnine as sulphate. One-half of this residue was thrown down with ammonia, then added to the other half, and shaken with ether. The aqueous residue, on addition of ammonia, gave first a precipitate of belladonnine, and then of atropine. The belladonnine, separated from its solution in ether, was dried; it was a yellowish brown resin, almost insoluble in water, easily soluble in alcohol and in chloroform, and somewhat less in ether. It forms neutral salts with acids, the sulphate being a resin.

With alcoholic potash it decomposed into tropine and a resinous body, named by the author *belladonnic acid*, which differs in its properties from tropic acid. Belladonnine may therefore be regarded as a compound of this acid with tropine.

Tropine, obtained by distilling the residues from which the belladonnine has been separated with lime, is a liquid of the consistence of castor oil, but after some time becomes crystalline. It is easily soluble in water and in alcohol, has a smell resembling that of tobacco, and a strong alkaline reaction. Its sulphate is easily soluble.

Benzoyl-tropine, prepared by adding benzoyl chloride to tropine, closely resembles atropine, which is tropyl-tropine.

Physiological experiments with these bodies showed that tropine has no action on the pupil, unless an atom of hydrogen is replaced by an acid radicle, but that this action depends on the nature of the radicle. Atropine possesses it more strongly than belladonnine or benzoyl-tropine. The action on the heart also is recognizable in tropine, but to a less degree than when the hydrogen is replaced.

It is probable, from Geiger and Hesse's experiments, that the

alkaloid obtained from the seed of the datura, called by them *daturine*, is a substituted tropine, the acid probably being an isomeride of tropic acid.

The same chemists isolated an alkaloid from henbane, and named it *hyoscyamine*, which according to Hôhn and Reichardt's experiments, is decomposed by baryta-water into hyoscinic acid, $C_9H_{10}O_3$, and hyoscine, $C_6H_{13}N$; the two formulæ when added together amount to that of hyoscyamine, $C_{15}H_{23}NO_3$. Either, then, the formula of the acid or of hyoscine, or of the alkaloid must be incorrect, as no water is evolved. The action of hyoscyamine is similar to that of atropine. Two samples of hyoscyamine were obtained by the author: one was crystallized, and acted physiologically as stated by Hellmann; the other was a syrup, and produced a reflex action of the nerves, which was not observable with the crystallized alkaloid. The probability is, therefore, that a second alkaloid was present. For this hypothetical substance, the author suggests the name *sikeranine*, from sikerân, the Persian name of hyoscyamus.

Hydriodate and Hydrobromate of Morphine. Dr. E. Schmidt. (*Ber. der deutsch. chem.-Ges.*, x., 194.) The author has prepared the hydriodate of morphine by dissolving the pure alkaloid in hydriodic acid, and also by double decomposition from acetate of morphine and iodide of potassium, and finds that the products of these two processes are identical. The salt crystallizes in stellate groups of long, silky needles, which are sparingly soluble in cold, but readily soluble in hot water, and have a composition answering to the formula $C_{17}H_{19}NO_3HI + 2H_2O$. At 100° C. they part with their water of crystallization, but re-absorb it on exposure to the air.

The hydrobromate crystallizes in tufts of long needles of the composition of $C_{17}H_{19}NO_3HBr + 2H_2O$, which also part with the whole of their water at 100° C. The salt used in the author's experiment was prepared by neutralizing hydrobromic acid with pure morphine.

The Estimation of Morphine in Opium. G. D. Hays. (*New Remedies*, July, 1878, 193.) After giving a review of several processes usually employed for assaying opium, among them the officinal process of the U. S. Pharmacopœia, which the author finds to yield unreliable results, he records as follows:—

A fresh portion of the drug (powdered) was treated with water until exhausted, the liquid evaporated to a small bulk, and the concentrated infusion precipitated with the officinal quantity of ammonia water. The precipitated morphine was filtered off, and the filtrate exposed in a capsule to a warm atmosphere. The excess of

ammonia was thus expelled, and a further precipitate of impure morphine occurred. As before, after repeated experiments with different samples of the drug, obtaining like results, this method was also abandoned. The impure morphine which had been obtained in these experiments was dissolved in dilute acid, and the coloured solution thus formed treated with animal charcoal. When decolorized, it was filtered, the charcoal thoroughly washed, and the washings, together with sufficient water of ammonia, added to the filtrate. The morphine which then precipitated was found to be largely contaminated with phosphate of calcium derived from the charcoal. Samples of this latter, from which the phosphate of calcium had been entirely removed, lost in a like measure their absorbing power.

Several methods were adopted with a view to separate the alkaloid from the calcium salt; but not giving accurate results, they in turn were abandoned. Other experiments were instituted, in which the solution of morphine salt was treated with caustic potassa in excess, by which means the phosphate of calcium was precipitated, and the morphine held in solution. The mixture was filtered, the precipitate washed with solution of potassa, and the filtrate carefully neutralized with hydrochloric acid, and allowed to stand for twenty-four hours. This gave by far the most satisfactory results that had as yet been obtained; but the process was far from perfect. The next method tried was a modification of that proposed by Dr. Gregory. The infusion of opium was mixed with a solution of calcium chloride, and evaporated cautiously to the consistence of a soft extract. This was triturated with water, thrown upon a filter, and the meconate of calcium, thus rendered insoluble, well washed, the washings being added to the filtrate. The solution of muriate of morphine thus obtained was decolorized with animal charcoal, filtered, and the charcoal well washed with hot water. The liquid being neutral, the phosphate of calcium remained undissolved. The filtrate having been evaporated to a small bulk, water of ammonia was added to it in the slightest possible excess, and the whole allowed to stand for twenty-four hours, the morphine then separating in clear crystals. A filter was dried until it ceased to lose weight. This weight was then accurately determined, and the liquid and the precipitate poured upon it. The precipitate was washed with cold water and dried, first between bibulous paper, and then by means of a hot air bath until it ceased to lose weight. On subtracting the weight of the filter from the weight of the whole, the percentage of morphine was determined.

To test the accuracy of this process, a weighed quantity of sul-

phate of morphine was treated with a solution of calcium chloride in alcohol, and the sulphate of calcium, which precipitated on standing, filtered off. The filtrate was exposed in a capsule to a warm atmosphere until, by evaporation of the alcohol, the muriate of morphia was left dry. This was dissolved in the proper proportion of water, and treated by the method last described. The result was most satisfactory, only a minute fraction of one per cent. being lost. This method was accordingly adopted in the subsequent analyses.

Meconic acid was obtained by suspending the meconate of calcium (a by-product of the process) in warm water, and decomposing by hydrochloric acid. On cooling, the former acid crystallizes out, being insoluble in cold water.

Narcotine was obtained by boiling the mass filtered from the infusions of opium in dilute acetic acid, filtering and neutralizing with water of ammonia. The Dispensatory states that narcotine is separated by heating from its solution in acetic acid. The author's experiments, however, do not substantiate this statement.

Codeine, being soluble in water, is extracted from opium along with the morphia, but remains in solution when that alkaloid is precipitated by ammonia. From this solution it is obtained by cautious evaporation.

These experiments gave the following average results:—

No. of Sample.	Percentage of Morphine found.
1	15·72
2	15·41
3	14·16
4	13·34
5	12·39
6	12·08
7	10·83
8	8·95
9	5·20

Apomorphine. M. Patrouillard. (*Journ. de Pharm. et de Chim.*, 1877; *Zeitschr. des oesterr. Apoth. Ver.*, 1878, No. 9.) Amorphine, of English manufacture, was found by the author to be a voluminous powder of grey colour, intermixed with blackish granules. Under the magnifying glass it appeared as glossy scales. It has a slightly bitter taste, is soluble in water, alcohol, and ether; and is coloured dark red to violet by nitric acid, the colour becoming gradually lighter and the mixture sticky, but thin again and brown on the addition of ammonia. Ferric chloride coloured it rose-red, the colour changing to violet and finally black. The aqueous solu-

tion yields with solution of iodine a red precipitate which dissolves on heating and colours the solution red, afterwards brown. The aqueous and alcoholic solutions of the alkaloid are at first colorless with a greyish tint, but on exposure to the air become greenish, and finally emerald green.

Detection of Traces of Water in Alcohol. A. Claus. (*Ber. der deutsch. chem.-Ges.*, x., 927.) If 1 milligram of anthraquinone is mixed in a test tube with a small quantity of sodium amalgam, and then vigorously shaken with pure ether free from alcohol, the quinone crystals are converted into brownish black, shining, minute, crystalline scales, which are probably a sodium combination of the quinone. If now a drop of water be allowed to fall into the ether, and the test tube slightly moved, a beautiful red coloration will be noticed in the zone immediately surrounding the amalgam, which immediately disappears on shaking with air, and reappears on standing. By mixing a trace of anthraquinone with sodium amalgam and pure absolute alcohol, a dark green coloration will soon be formed at the point of contact between the amalgam and the alcohol, which upon gently moving the test tube will extend through the whole liquid, but will also disappear on shaking with air. If the alcohol should contain the smallest trace of water, the red coloration above-mentioned will be produced, and will disappear and reappear alternately on shaking with air and standing at rest. This reaction forms an excellent means of detecting small quantities of water in alcohol.

Cinchona Alkaloids: Cusconine and Aricine. O. Hesse. (*Liebig's Annalen*, clxxxv., 296, 323; *Journ. Chem. Soc.*, 1878, 155.) In this paper the author gives the results of his examination of a cusco bark, apparently identical with that examined by Liverköhn (*Repert. Pharm.*, 33, 357), who found it to contain aricine. The bark gives off brown vapours when heated, and yields at last a brown tar, thereby differing from barks containing quinine or isomeric alkaloids, all of which give off red vapours when heated. The author has found in the bark—aricine, a new base called *cusconine*, and a small quantity of an amorphous alkaloid, which he believes to be derived from the other two. These bases do not exist in the bark in the free state, since they cannot be extracted by chloroform. They were isolated in the following manner:—An alcoholic extract of the comminuted bark was supersaturated with soda and shaken with ether, and the ethereal liquid was agitated with acetic acid, which took up the greater part of the alkaloids. The acetic solution was partially neutralised with ammonia, which threw down aricine

acetate, and the filtrate from this substance was then mixed with a strong solution of ammonium sulphate, whereupon the cusconine was precipitated as a sulphate. The mother-liquor contained the amorphous alkaloid, which has not been further examined. The percentage of alkaloids contained in the bark was about 0·62 of aricine, 0·93 of cusconine, and 0·16 of amorphous substance.

Cusconine is thrown down from the sulphate by ammonia as an amorphous precipitate, crystallizing from ether in white laminæ, and from alcohol or acetone in larger crystals. It dissolves in 35 times its weight of ether, more easily in alcohol and acetone, and very freely in chloroform, but is nearly insoluble in water. Strong nitric and sulphuric acids dissolve it with greenish coloration. A little cusconine added to a warm solution of ammonium molybdate in strong sulphuric acid colours it a dark blue, changing to olive green when heated, and again turning blue when the liquid cools. This reaction is characteristic of cusconine and aricine. Cusconine rotates a ray of polarized light to the left in the ethereal solution $(a)_D = -27°$. The formula of the crystallized substance is $C_{23}H_{26}N_2O_4 + 2H_2O$, the water being given off at 80°. The anhydrous alkaloid melts at 110°. It is a feeble base, forming salts which have a more or less acid reaction. The following salts have been prepared :—

Neutral sulphate, $2C_{23}H_{26}N_2O_4, SO_4H_2$.—Crystallizes from alcohol in laminæ. The *acid sulphate* is gelatinous and uncrystallizable.

Hydrochloride.—Not crystallizable. Forms with mercuric chloride a white pulverulent precipitate.

Platinochloride, $2(C_{23}H_{26}N_2O_4, HCl) + PtCl_4 + 5H_2O$.—Amorphous flocculent, dark yellow precipitate.

Aurochloride.—Dirty yellow amorphous flocculent precipitate, decomposing when warm.

Hydrobromide.—Colourless; amorphous; soluble in water, from which it is precipitated by potassium bromide.

Hydriodide.—Pale yellow amorphous precipitate; freely soluble in water, but sparingly soluble in solution of potassium iodide.

Thiocyanate, $C_{23}H_{26}N_2O_4, CNSH + 2H_2O$.—Pale yellow amorphous powder.

The *nitrate*, *acetate*, *citrate*, *tartrate*, *oxalate*, *thiosulphate*, and *salicylate* are all gelatinous and non-crystallizable.

Aricine is obtained in the free state by decomposing the acetate with soda. It crystallizes in white prisms, which dissolve very easily in chloroform, and less freely in ether and alcohol, but not in

water. It melts at 188°, and decomposes at higher temperatures. With strong nitric and sulphuric acids it behaves in the same manner as cusconine. Its taste is slightly astringent, not bitter. In alcoholic or ethereal solution it rotates a ray of polarized light to the left. Analyses of aricine lead to the formula $C_{23}H_{26}N_2O_4$, which is that of anhydrous cusconine. The neutral salts have a more or less acid reaction, and are partially decomposed by water. Solutions of the salts turn yellow after a time, the alkaloid becoming converted into a coloured amorphous substance.

The *hydrochloride*, $C_{23}H_{26}N_2O_4, HCl + H_2O$, separates from its aqueous solution, on evaporation, in the form of a jelly, which afterwards crystallizes.

The *platinochloride*, $2(C_{23}H_{26}N_2O_4, HCl)\,PtCl_4 + 5H_2O$, is an amorphous, orange coloured precipitate, sparingly soluble in water.

The *aurochloride* is a dirty yellow amorphous precipitate, easily decomposed.

The *neutral sulphate*, $2C_{23}H_{26}N_2O_4, SO_4H_2$, is precipitated as a white gelatinous mass, made up of delicate needles.

The *acid sulphate* is thrown down in small white prisms on adding sulphuric acid to a solution of the hydrochloride.

The *neutral oxalate* is a granular white crystalline powder.

The *acid oxalate*, $C_{23}H_{26}N_2O_4, C_2H_2O_4 + H_2O$, is precipitated by oxalic acid, from a solution of the hydrochloride. It crystallizes in prisms, which soon change to rhombohedrons. The salt requires for solution 2025 parts of water at 18°, and hence affords a means of separating aricine from cusconine.

The *nitrate*, $C_{23}H_{26}N_2O_4, NO_3H$, is precipitated by nitric acid from a warm solution of the hydrochloride. It forms delicate white prisms, easily soluble in alcohol.

The *hydrobromide* is a white amorphous powder. The *hydriodide* forms small white prisms.

The *thiocyanate*, $C_{23}H_{26}N_2O_4, CNSH$, crystallizes in small white prisms.

The *salicylate*, $C_{23}H_{26}N_2O_4, C_7H_6O_3 + 2H_2O$, is a pale yellow pulverulent precipitate, sparingly soluble in water, easily in alcohol.

The *acetate*, $C_{23}H_{26}N_2O_4, C_2H_4O_2 + 3H_2O$, is obtained by precipitating the hydrochloride either with sodium acetate or with acetic acid, a reaction which distinguishes aricine from all other alkaloids. It forms white granular crystals very sparingly soluble in cold water. At 100° the acid is expelled, leaving the free alkaloid.

The *acid citrate* and the *neutral tartrate* are both crystalline salts.

Review of the Cinchona Alkaloids. Dr. O. Hesse. (*Ber. der deutsch. chem.-Ges.*, x., 2152. From *Amer. Journ. Pharm.*)

Quinine, $C_{20}H_{24}N_2O_2$.—Precipitated by ammonia or soda, it is amorphous and anhydrous, but soon combines with $3H_2O$, forming small crystals. Both the anhydride and trihydrate are readily soluble in ether, which on slow evaporation yields some fine white needles; the balance, at first amorphous, becomes crystalline after some time. The ethereal solution sometimes gelatinizes suddenly from the separation of quinine, which is then less freely soluble in ether, requiring at 15° C. for 1 part of quinine (anhydrous) 16 to 25·5 parts of ether to effect solution. The anhydride fuses at 177° C., the trihydrate at 57° C.; the former dissolves in hot water without fusing, and on cooling separates in needles; the latter fuses in boiling water, and on cooling does not crystallize. A solution of quinine in an excess of diluted H_2SO_4 has a blue fluorescence, while with a solution in diluted HCl this is not the case. The fluorescence disappears also upon the addition of other substances, notably of chlorides. Quinine solution turns polarized light to the left. Chlorine and ammonia in excess cause a green coloration (thalleiochin). The neutral sulphate, $2C_{20}H_{24}N_2O_2.SO_4H_2 + 8H_2O$, is very effluorescent; the medicinal salt should contain 15·3 per cent. of water of crystallization = $7\frac{1}{2}H_2O$.

Conquinine (quinidine), isomeric with quinine, but rotating to the right, was discovered by Van Heijningen; it crystallizes from alcohol with $2\frac{1}{2}H_2O$ in effluorescing prisms; from ether in rhombohedrons with $2H_2O$; from boiling water in delicate plates with $1\frac{1}{2}H_2O$; in the two latter forms it does not effluoresce at the ordinary temperature. The salt mostly met with in commerce has the formula $2C_{20}H_{24}N_2O_2.SO_4H_2 + 2H_2O$.

Quinicine, $C_{20}H_{24}N_2O_2$.—By heating the sulphate or other salt of quinine or conquinine until melted, it is transformed into sulphate of quinicine without losing weight. Quinicine is amorphous, rotates the plane of polarization to the right, and is never present in cinchona bark.

Diconquinine (apo-diquinicine), $C_{40}H_{46}N_4O_3$, the principal constituent of chinoidin, is amorphous, fluoresces in a sulphuric acid solution, like quinine and quinidine; gives a green coloration with chlorine and ammonia in excess, and rotates the plain of polarization to the right. It does not yield quinicine, and has not yet been converted into quinidine.

Cinchonidine, $C_{20}H_{24}N_2O$,—first observed by Henry and Delondre (1833), again discovered by Winckler (1844) as quinidine, and

subsequently called *x* quinidine by Kerner,—crystallizes from alcohol in shining prisms, rarely in delicate white needles or plates, the crystals being anhydrous. Its solutions rotate the plane of polarization to the left, are not fluorescent, and not coloured green by chlorine and ammonia. The sulphate has the formula $2\,C_{20}H_{24}N_2O.SO_4H_2 + 6\,H_2O$, and is nearly insoluble in chloroform, but swells with it to a jelly-like mass.

Cinchonine, $C_{20}H_{24}N_2O$ (isomeric with cinchonidine), crystallizes from hot stronger alcohol in shining anhydrous prisms. Its solutions are dextrogyre, and show no fluorescence. The sulphate, $2\,C_{20}H_{24}N_2O.SO_4H_2 + 2\,H_2O$, crystallizes from water in compact prisms.

Cinchonicine, $C_{20}H_{24}N_2O$.—Anhydrous monobasic sulphate of cinchonidine or cinchonine, heated to 130° C., or until they melt, are transformed into sulphate of cinchonicine. The alkaloid rotates the plane of polarization to the right; is amorphous, and never present in cinchonine barks. Some salts are crystallizable.

Dicinchonine, $C_{40}H_{48}N_4O_2$, may be expected in the quinoidine of such barks which contain a large percentage of cinchonidine or cinchonine. As yet it has not been obtained entirely free from diconquinine.

Homocinchonidine, $C_{19}H_{22}N_2O$ (Koch's conquinidine, 1877), crystallizes from strong alcohol in large prisms, and from diluted alcohol in scales, and deviates the plane of polarized light to the left. The sulphate $= 2\,C_{19}H_{22}N_2O.SO_4H_2 + 6\,H_2O$, crystallizes in very delicate needles, which have a gelatinous aspect, and while still moist melt at about 30° C.; when carefully dried, it resembles magnesia in appearance, is usually anhydrous, and in this condition swells with chloroform to a jelly-like mass. The *cinchovatina* (*aricana*) of Winckler, from *C. ovata*, is mainly this alkaloid.

Homocinchonine, $C_{19}H_{22}N_2O$, is probably identical with Scraup's (1877) cinchonine, and appears to be present in the bark of *C. rosulenta*.

Homocinchonicine, $C_{19}H_{22}N_2O$, an amorphous alkaloid, is formed when the anhydrous monobasic sulphate of homocinchonidine is melted. Its oxalate $= 2\,C_{19}H_{22}N_2O.C_2H_2O_4 + 4\,H_2O$, greatly resembles the corresponding salt of cinchonicine.

Dihomocinchonine (di-homocinchonicine), $C_{38}H_{44}N_4O_2$, is amorphous, rotates the plane of polarization strongly to the right. Yields amorphous salts, and is also present in the bark of *C. rosulenta*.

Quinamine, $C_{19}H_{24}N_2O_2$, discovered by the author (1872) in

the bark of *C. succirubra* grown at Darjeeling, and subsequently in all barks of the same species from British India and Java, in Mutis' quinquina rouge, and in the barks of *C. nitida*, *C. erythrantha*, *C. erythroderma*, *C. rosulenta*, *C. Calisaya*, var. Schuhkrafft, and *C. Calisayá*, known in English commerce as Para bark. It is separated from the amorphous alkaloids by precipitating the dilute acetic acid solution with potassium sulphocyanide until the liquid is pale yellow; when clear it is supersaturated with ammonia, agitated with ether, the ethereal solution evaporated, and the residue crystallized from hot dilute alcohol; the mother-liquor retains the balance of the amorphous bases. The author now regards his first formula, $C_{20} H_{26} N_2 O_2$, as incorrect.

Conquinamine (quinidamine), $C_{19} H_{24} N_2 O_2$, is present with the preceding in *C. succirubra* and *C. rosulenta*, and perhaps in all barks mentioned above. It crystallizes in long shining prisms, which melt at 123° C., while quinamine melts at 172° C. It is more powerfully dextrogyre than quinamine, and like it is precipitated by chloride of platinum only from concentrated solutions; and yields with chloride of gold a yellow precipitate, changing to purple, and with hydriodic acid a salt crystallizing in handsome prisms.

Quinamidine, $C_{19} H_{24} N_2 O_2$, an amorphous alkaloid, is formed when quamine is boiled for some time with diluted $H_2 SO_4$; it is precipitated from an acid solution with difficulty by ammonia, more easily by soda, and is easily soluble in ether. With H Cl it forms prismatic crystals, sparingly soluble in water; and with chloride of gold, a yellow amorphous precipitate, soon turning purple.

Apoquinamine, $C_{19} H_{22} N_2 O$, is isomeric with homocinchonidine, and is formed by the action of concentrated H Cl on quinamine and conquinamine, $C_{19} H_{24} N_2 O_2 - H_2 O = C_{19} H_{22} N_2 O$. It is a white amorphous powder, very soluble in ether, alcohol, and in diluted H Cl. The chlorhydrate is amorphous; chloride of platinum causes a yellow amorphous precipitate, $(C_{19} H_{22} N_2 O H Cl)_2 + Pt Cl_4$; chloride of gold gives a similar precipitate, which does not turn purple.

Quinamicine, $C_{19} H_{24} N_2 O_2$, is formed when quinamine and probably also conquinamine, in the form of sulphate, is heated to 100° C. The residue is dissolved in cold water, precipitated by sodium bicarbonate, and the alkaloid freed from quinamidine by repeated solution in acetic acid and precipitation with bicarbonate. Quinamicine is a white amorphous powder, which fuses between 95° and 102° C., is slightly dextrogyre and freely soluble in ether and in diluted $H_2 S O_4$; the latter solution yields yellow precipitates with the chlorides of platinum and of gold.

Protoquinamicine, $C_{17} H_{20} N_2 O_2$, is formed, like the preceding, by raising the temperature to above 100° C., preferably to between 120° and 130° C. The sulphate is nearly insoluble in cold water. The alkaloid is insoluble in ether, but dissolves readily in acetic acid, forming a brown solution, from which it is precipitated by ammonia or sodium bicarbonate, in light brown amorphous flakes, becoming black-brown on drying.

Paricine, $C_{16} H_{18} N_2 O$, found with quinamine in red bark from Darjeeling; it is at once precipitated by bicarbonate of sodium from dilute solutions, and forms a pale yellow amorphous powder, soluble, with a yellow colour, in ether, when fresh, and yielding amorphous salts; chloride of gold causes a muddy yellow coloration, which will not turn purple.

Paytine, $C_{21} H_{24} N_2 O + H_2 O$, contained in the white cinchona bark of Payta; it crystallizes in beautiful prisms, and has the same reaction with chloride of gold as quinamine, conquinamine, and quinamidine; it differs from them, however, in being easily precipitated by chloride of platinum. Paytine rotates the plane of polarized light to the left.

Paytamine is the amorphous alkaloid present with paytine in the above bark; it is easily soluble in ether, is coloured purple by chloride of gold, and precipitated by chloride of platinum.

Cusconine, $C_{23} H_{26} N_2 O_4 + 2 H_2 O$, crystallizes in small plates, was discovered by Leverköhn in Cusco cinchona, and differs from all other cinchona alkaloids by forming an amorphous jelly-like sulphate with $H_2 S O_4$, which is not dissolved by adding more acid. Its acetate and other salts are likewise gelatinous.

Aricine, $C_{23} H_{26} N_2 O_4$, is found in the same bark as cusconine; it was discovered by Pelletier and Coriol, crystallizes in white, shining prisms, which melt at 188° C., rotates the plane of polarization to the left, like cusconine, and forms salts, which are sometimes gelatinous, but are more characterized, particularly the binoxalate and acetate, by their sparing solubility.

Cusconidine, also a constituent of the Cusco bark, is precipitated by ammonia from solutions in acids in pale yellow amorphous flakes, which after being washed form a loosely coherent mass, become denser on drying in the air, and ultimately melt together. Its composition has not yet been determined.

Javanine was separated by the author from the so-called amorphous bases of Java Calisaya bark. It separates from water slowly in rhombic scales, is very easily soluble in ether, without crystallizing on evaporation, dissolves in dilute sulphuric acid with an intense

yellow colour, and yields with oxalic acid a neutral salt crystallizing in scales.

Another alkaloid was observed in young Calisaya bark from Bolivia; it is liquid, produces a greasy stain upon paper, and has a penetrating odour reminding of quinotinal. Other derivatives are the *hydrocinchonines* and the bases obtained by Zorn by acting with highly concentrated muriatic acid upon the four more common cinchona alkaloids.

The Preparation of Neutral Tannate of Quinine. P. J. Haaxmann. (*L'Union Pharmaceutique*, 1877, 135.) This preparation of quinine is recommended on account of its tastelessness. It is prepared by precipitating quinine by means of sodium hydrate from a solution of one part of sulphate of quinine in acidulated water, washing the precipitated alkaloid, then dissolving it in ten parts of alcohol of ·828 sp. gr., and diluting the solution whilst heated on a water bath with warm water, but not so much as to cause the separation of quinine. This liquid is added gradually, and with constant stirring, to a solution of three parts of tannin in sixty parts of distilled water, the mixture heated on the water bath for about fifteen minutes, then poured upon a filter, the precipitate washed with warm water until the washings are colourless and free from bitterness and astringency, or until they cease to form a precipitate on cooling. The precipitate, which at first was an acid tannate of quinine, is converted by this washing into a neutral and tasteless preparation. The filtrate and the washings deposit, on cooling, a tannate of quinine, differing essentially from that left in the filter by its strongly bitter taste. The contents of the filter, after sufficient washing, are dried at a moderate temperature on a water bath.

Preparation of Tannate of Quinine. M. Stoeder. (*Pharmaceut. Zeitung*, 1877, No. 97; *New Remedies*, 1878, 12.) The author prepares the salt by the following process:—Dissolve 40 grams of quinine sulphate in 800 grams of water, containing 30 grams of sulphuric acid, and add to it a solution of 120 grams of tannic acid in 2400 grams of water. The precipitate is transferred to a linen strainer, washed, strongly pressed, dried in the air, and powdered. The yield is 140 grams of quinine tannate of a handsome light yellow colour. An entirely neutral and tasteless salt may be produced by precipitating a boiling, non-acidified solution of quinine sulphate by tannic acid, collecting the precipitate, washing and drying in the air. This product, however, contains much less tannic acid than the former. It follows, therefore, that Haaxmann's method (described in the preceding abstract), according to which

the precipitate is washed with boiling water, changes the composition of the salt, so that it finally contains, in 100 parts, not more than 21 parts of quinine.

A. Bernick, in the *Pharmaceutische Zeitung*, 1878, No. 30, also gives a process for the preparation of a tasteless tannate of quinine. To a mixture of 20 parts of sulphate of quinine, with 600 parts of distilled water of 60° to 70° C., dilute sulphuric acid is slowly added until the sulphate is nearly but not entirely dissolved. To the solution is gradually added, with constant stirring, a solution of 60 parts of tannin in 600 parts of cold distilled water. The precipitate is collected upon a filter, washed with 100 parts of distilled water, and dried upon bibulous paper at the ordinary temperature. The yield is 70 parts. The filtrate contains a little tannin, but not a trace of quinine. The process is a modification of the one adopted by the German Pharmacopœia.

Tannate of Quinine. J. Jobst. (*Archiv der Pharmacie*, April, 1878, and *Pharmaceutische Zeitung*, 1878, No. 20.) According to the author's statements, quinine and tannin form but few definite compounds, and these can only be prepared from definite quantities of sulphate of quinine and tannin. The so-called tasteless tannates of quinine of commerce are comparately worthless, and are the more tasteless the less quinine they contain. The washing of quinine tannate in hot water, as in Haaxmann's process, results in the production of a preparation very poor in alkaloid. The commercial tannates of quinine should also be tested for the cheaper cinchona alkaloids which are not unfrequently substituted for quinine. The following test is recommended for this purpose :—One gram of the tannate is reduced to powder, well stirred up with fresh milk of lime, and the mass dried on the water bath. The resulting powder is exhausted with chloroform, and the chloroformic solution evaporated in a beaker glass. The residue, dried at 120°, indicates the total amount of alkaloids. A little water and a few drops of sulphuric acid are now added, sufficient to dissolve the dry alkaloids, the solution, if necessary, filtered, the filtrate mixed with 3 to 4 c.c. of ether and with ammonia in excess, and the whole well shaken. Both layers of liquid will remain clear if only quinine was present, while in presence of cinchonine or cinchonidine, more or less of the alkaloids will remain undissolved, or at least will again separate.

Decomposition Products of Quinine. W. Ramsay and J. J. Dobbie. (*Journ. Chem. Soc.*, March, 1878). The authors treated 5 grams of quinine with 50 grams of potassium permanganate, until

the whole of the latter was reduced. The alkaline liquid was filtered from $Mn\,O_2$, and the filtrate neutralized with nitric acid. On adding lead nitrate to the hot neutral solution, a curdy white precipitate of the lead salt of a new acid (previously noticed also by Cloez and Guignet) was obtained. The lead being removed by $H_2\,S$, the clear filtrate on evaporation deposited a red powder, which appeared to be identical with Marchand's quinetin; while the remaining liquid yielded a crystalline acid. This was converted into the silver salt, and the acid once more separated. It was found to be dicarbopyridenic acid ($C_7\,H_5\,N\,O_4$, $H_2\,O$), no doubt identical with that produced by Professor Dewar by oxidizing picoline with potassium permanganate.

Note on Deacon's Chlorine Process. C. Hensgen. (*Dingl. polyt. Journ.*, ccxxvii., 369–374.) The author explains the decomposition taking place in Deacon's chlorine process as follows:—The copper sulphate in a stream of dry gaseous hydrochloric acid gas is converted into $Cu\,Cl_2 + H_2\,S\,O_4$, a compound which is at once decomposed by oxygen and heat, while the hydrochloric acid thus liberated is split up into free chlorine and water:—

$$Cu\,S\,O_4 + 2\,H\,Cl = Cu\,Cl_2 + H_2\,S\,O_4.$$
$$Cu\,Cl_2 + H_2\,S\,O_4 + O = Cu\,S\,O_4 + H_2\,O + Cl_2.$$

The Ash of Cane and Beetroot Sugars. J. W. Macdonald. (*Chem. News*, xxxvii., 128.) The author gives the following as the average composition of the ashes of cane and beetroot sugars, showing considerable differences in the relative proportions of some of the constituents, especially of the soda, and the ferric and aluminic oxides:—

	Cane Ash.	Beet Ash.
Potash	28·79	34·19
Soda	0·87	11·12
Lime	8·83	3·60
Magnesia	2·73	0·16
Ferric Oxide and Alumina	6·90	0·28
Sand and Silica	8·29	1·78
Sulphuric Anhydride	43·65	48·85
	100·06	99·98

The volatile acids had been expelled by the sulphuric acid employed in the sugar analysis.

The Acid of Willow Bark. D. B. Dott. (*Pharm. Journ.*, 3rd series, viii., 221.) An infusion of willow bark is distinctly acid to litmus. In the preparation of salicin by Erdmann's process, this

acid is neutralized by the excess of lime, and the salt thereby formed passes into solution. On evaporating to dryness and exhausting the residue with spirit, the salt is redissolved and remains in the spirituous solution after the salicin has crystallized out. The salt may be obtained by distilling off the spirit and allowing the residue to crystallize. These crystals are then purified by recrystallization from water. Thus prepared the lime salt separates in the form of a cauliflower-like mass composed of radiate groups of prismatic crystals.

A portion of these crystals when fused and ignited left a residue of calcic carbonate, indicating an organic salt of lime. It was found that the substance lost weight but slowly in the exsiccator, and likewise in the water bath. A portion of the air-dried salt was therefore dried in the air bath at 130° C. 9·140 grams lost 2·745 grams = 30·03 per cent. In another determination with a different crop of crystals, 7·85 grams lost 2·275 grams = 28·98 per cent. A quantity of the salt was then incinerated in a platinum crucible, the residue being treated with excess of sulphuric acid, and the crucible again ignited. 6·41 grams gave 4·00 grams $CaSO_4$ = 1·176 gram Ca = 18·34 per cent. In the second determination 6·12 grams gave 3·82 grams $CaSO_4$ = 1·12 gram Ca = 18·35 per cent.

Several methods for preparing the acid were tried, the following being the process finally adopted:—To a solution of the lime salt in water solution of oxalic acid is added not in excess. The precipitate is then separated by filtration, the filtrate concentrated and extracted with ether, which dissolves the acid. The ether being now driven off, a syrupy solution of the acid is left. A few ounces were prepared by this method and placed over sulphuric acid under a bell-glass for two days. The acid then remained in the form of a syrup, almost odourless, with an intensely sour taste. As in these respects it exactly resembled lactic acid, and seeing that the calcium salt in its crystalline form and in its percentages of H_2O and Ca corresponded with calcic di-lactate, there could be little doubt that the acid under examination was lactic acid. To make more certain, however, some further tests were applied. A little was heated in a test tube, when water and carbonic anhydride were given off, and a residue left which shortly solidified. A portion was then boiled with sulphuric acid, which liberated an inflammable gas burning with a blue flame—no doubt carbon monoxide. When a small quantity was heated with sulphuric acid and manganese dioxide, a vapour smelling like aldehyde was evolved. A portion of the acid was distilled, and the fraction coming over above 130° C. was

evaporated and treated with cold alcohol, which separated small white crystals having the form of rhomboidal plates, and in other respects resembling lactide.

From the acid as above obtained the zinc salt was prepared by warming with excess of zinc carbonate, filtering, and allowing to crystallize. The crystals were pressed between blotting paper and exposed for a short time to the air. In these air-dried crystals the H_2O was determined by drying in the water bath; 6·065 grams lost 1·125 gram = 18·46 per cent. In a second determination, with another crop of crystals, 9·275 grams lost 1·695 gram = 18·27 per cent. The zinc was determined in the dry salt by ignition in the blowpipe flame; 6·33 grams gave 2·12 grams Zn O = 33·49 per cent. In another determination, 7·58 grams gave 2·55 grams Zn O = 33·64 per cent.

The above numbers are here compared with those calculated for the normal calcium and zinc salts of lactic acid respectively— $Ca(C_3H_5O_3)_2, 5H_2O$:—

		Found.	
Per cent.	I.	II.	Mean.
H_2O . . 29·22	30·03	28·98	29·505
Ca . . 18·34	18·34	18·35	18·345

$Zn(C_3H_5O_3)_2, 3H_2O$:—

		Found.	
Per cent.	I.	II.	Mean.
H_2O . . 18·33	18·46	18·27	18·36
ZnO . . 33·38	33·49	33·64	33·56

The Zn O is too high, owing either to an impurity in the salt or to a fault in the analysis. The zinc salt crystallized in four-sided truncated prisms, which were insoluble in alcohol.

The author is unable to state from what species of *salix* the acid was prepared; but as all the samples of bark he has examined give acid infusions, it is not improbable that lactic acid exists in all the members of the salicaceæ.

The Tannic Acid of Guarana. Dr. F. V. Greene. (*Amer. Journ. of Pharm.*, August, 1877.) During an investigation lately made with a view to the extraction of the caffeine from guarana, several of the reactions of the accompanying tannic acid were so strikingly dissimilar from those of the tannic acids generally, as to induce the author to isolate it for the purpose of an examination. A quantity of guarana in fine powder was treated with successive portions of boiling alcohol (75 per cent.), the alcoholic solutions filtered when cold, and the alcohol driven off on a

water bath. The aqueous solution was then diluted with distilled water, and a slight excess of basic acetate of lead added, which threw down a voluminous flesh-coloured precipitate. This was thoroughly washed with distilled water, decomposed by sulphuretted hydrogen, and the sulphide of lead removed by filtration. The filtrate, after being heated on a water bath to drive off the excess of sulphuretted hydrogen, and filtered, gave a clear solution with a scarcely perceptible tinge of yellow. Evaporated to dryness, this solution yielded an amorphous, slightly yellow, semi-transparent, partially scaly mass, which had the peculiar taste of tannic acid. This mass dissolved very readily in alcohol, and on allowing the alcohol to evaporate spontaneously, it was still found in the amorphous condition. That it is not incapable of crystallization, however, was proved by drying a small quantity of the aqueous solution over sulphuric acid under a bell-glass, when acicular crystals, radiating from amorphous centres, were formed.

The following is a brief description of the behaviour of this acid with different reagents :—

With ferric salts it gives a greenish precipitate, turning to brown on standing; with ferrous salts no precipitate is produced, but the colour of the liquid is changed in a short time to a dark green. The fixed alkalies give the solution a dark, reddish brown colour; with ammonia it forms a lighter brown, while with lime-water it gives a greyish brown precipitate. It gives a green precipitate with acetate of copper, which is soluble in an excess of the precipitant. It does not precipitate the neutral sulphate of copper solution, but reduces the alkaline sulphate slowly in the cold, and rapidly when heated; it also reduces nitrate of silver by the aid of heat, and decomposes auric chloride in the cold. It gives dull white precipitates with barium salts (distinction from caffeotannic acid), and a white precipitate with stannous chloride. It resembles caffeotannic acid in not precipitating tartrate of antimony and potash, and by readily precipitating both cinchonine and quinine, but differs from it in precipitating gelatin from solution. Its reactions with the alkaloids and gelatin serve to distinguish it from catechuic acid. With lead acetate it gives a dull white precipitate. It quickly decolorizes the solution of permanganate of potash, and gives a dark red colour with molybdate of ammonia, which is discharged by oxalic acid.

It produces white precipitates with morphine and strychnine, and with aconitine and veratrine with hydrochloric acid; it does not precipitate atropine, either in neutral solution or in presence of an acid.

It gives no precipitate with salicin or santonin, but produces a bright yellow precipitate with piperin in presence of hydrochloric acid.

As these experiments show that the tannic acid of guarana does not give reactions precisely similar to those produced by any other of the tannic acids treated with the same reagents, it is but reasonable to conclude that it differs from them somewhat in chemical composition, and it should on this account have some distinguishing appellation. The author suggests that it might be termed *paullinitannic acid*, which would be preferable to guaranotannic, as future investigations may show the acid of *paullinia cupana*, which is used as a diet-drink, and probably of other species, to be identical with that of the *paullinia sorbilis*.

Cantharidin and an Acid Derivative thereof. J. Piccard. (*Ber. der deutsch. chem.-Ges.*, x., 1504–1506.) The mean of three determinations of the vapour density of this body is 6·5; hence its empirical formula is $C_{10}H_{12}O_4$, and not $C_5H_6O_2$, as hitherto accepted. Its fusing point is 280° C. (424·4° F.). When heated with hydriodic acid to 100° C. in sealed tubes, it is converted into a strong acid substance, named by the author *cantharic acid*, which after purification forms needle-shaped crystals, soluble in 120 parts of cold and 12 parts of boiling water, freely soluble in alcohol, slightly in ether, and insoluble in benzol. Its fusing point is 278° C. A solution of this body in glycerin does not blister the skin. It is a monobasic hydrate, the empirical formula of which is the same as that of cantharidin. The general formula of its alkaline salts is $C_{10}H_{11}O_3OR$; that of the lead salt $(C_{10}H_{11}O_4)_2Pb$.

Nicotine. R. Laiblin. (*Journ. Chem. Soc.*, from *Ber. der deutsch. chem.-Ges.*, x., 2136.) When oxidized by permanganate of potassium, added until no more is decolorized (10 grams nicotine in 500 c.c. of water require about 60 grams of permanganate dissolved in 2000 c.c. of water), this alkaloid yields carbonate and *pyridene-carbonate* of potassium. Free pyridene-carbonic acid, $C_6H_5NO_2$, or $C_5H_4N.COOH$, is obtained by filtering the solution from manganese dioxide, evaporating to dryness, taking up with alcohol, converting the dissolved potassium salt into silver salt, and decomposing it with sulphuretted hydrogen. After crystallization from hot alcohol or water, it forms colourless crystals, melting at 225°–227° (uncorrected), and only sparingly soluble in ether and chloroform. The author has analysed the free acid, its platinochloride, $(C_6H_5NO_2HCl)_2PtCl_4 + 2H_2O$, the potassium and silver salts, the hydrochloride, $C_6H_5NO_2HCl$, and the calcium salt,

$(C_6 H_4 N O_2)_2 Ca + 5 H_2 O$, and finds numbers uniformly agreeing with the formula, $C_6 H_5 N O_2$, originally proposed by Huber (who prepared his pyridene-carbonic acid by oxidizing nicotine with chromic acid liquor, and not agreeing at all with the formula, $C_{10} H_8 N_2 O_3$, proposed by Weidel, who employed nitric acid as oxidizer. On repeating Weidel's experiments, the acid obtained melted at the same temperature as that prepared by means of permanganate.

On distillation with lime, 20 grams of undried potassium salt gave nearly 5 grams of pure pyridine.

The Presence in Beer of a Substance resembling Colchicine. E. Danneberg. (*Archiv der Pharm.*, 1877, 238.) The continuation of the author's researches on this subject shows that the substance in question possesses the general properties of an alkaloid, but that it cannot be colchicine, as it fails to produce the characteristic reaction of the latter with nitric acid. It is prepared from the residue obtained by Stas' method, by dissolving it in water, precipitating by tannin, decomposing the precipitate by oxide of lead, and extracting with dilute alcohol. One part of colchicine dissolved in 50,000 parts of beer yielded by this process a substance giving an unmistakable reaction with nitric acid.

An abstract of the author's previous report on the subject will be found in the *Year-Book of Pharmacy*, 1877, 289.

Notes on Gardenin. J. Stenhouse and C. E. Groves. (*Journ. Chem. Soc.*, 1877, No. clxxiii.) This substance was discovered by one of the authors (*Stenhouse, Phil. Trans.*, 1856, cxlvi., 155, and *Ann. Chem. Pharm.*, xcviii., 316) some twenty years ago in "dikamali gum," a resinous exudation from the *Gardenia lucida;* but the amount of gardenin obtained at that time was insufficient to make a satisfactory analysis, the quantity of resin operated on being but limited. About three years ago, however, the receipt of a larger sample of the resin enabled the authors to obtain a few grams of the gardenin in the pure state. The resin from the *Gardenia lucida* has been fully described both by Dymock (*Pharm. Journ.*, 3rd series, vii., 491), and by Flückiger (*ibid.*, 589), the latter of whom, moreover, extracted the gardenin and analysed it.

The authors found that the best method of obtaining the crude gardenin was to boil the resin with alcohol, filter the solution to separate the insoluble residue, consisting chiefly of small fragments of bark and wood, and allow it to cool. It then deposited almost the whole of the gardenin in slender, pale yellow needles, which were collected and washed with cold spirit, to free them from the amorphous greenish yellow resin, which forms by far the larger por-

tion of dekamali gum. These needles, however, even after several crystallizations from alcohol, were found to be still impure, being contaminated with a colourless substance of low melting point, somewhat resembling a fat in appearance. After repeated trials in various ways, it was found that this impurity might be removed by means of light petroleum. A boiling saturated solution of the gardenin in alcohol was allowed to cool, and the almost pasty mass of crystals was agitated with light petroleum at a temperature of about 30°, the clear liquid poured off, and the residue again agitated with petroleum, repeating the operation several times. The gardenin was finally purified by alternate crystallization from hot benzine, in which it is readily soluble, and from alcohol.

When pure, gardenin forms brilliant deep yellow crystals, which melt at 163°–164°. Dried at 100°, and burnt in a current of oxygen, it gave the following results:—

1. ·249 gram of substance gave ·567 gram carbonic anhydride and ·119 gram of water.

2. ·202 gram of substance gave ·457 gram carbonic anhydride and ·102 gram of water.

C_{5} . . .	60	61·86	62·12	61·70	61·91	59·47
H_{5} . . .	5	5·16	5·31	5·60	5·45	6·71
O_{2} . . .	32	32·98	—	—	—	—
	97	100·00				

Flückiger's numbers do not agree with these; but as the specimen he analysed had merely been purified by repeated crystallization from spirit, it is not impossible that it was contaminated with traces of the colourless fatty substance mentioned above. This is rendered very probable by the much lower melting point (155°) which he obtained.

It was stated in the earlier paper (Stenhouse, *loc. cit.*) that when gardenin is digested with concentrated nitric acid, it is rapidly decomposed, picric acid, but no oxalic acid, being produced. This, on repeating the experiment, was found to be incorrect. Gardenin, when boiled with nitric acid, dissolves with evolution of nitrous fumes, forming a yellow solution, which, on evaporation, leaves a yellowish residue. This, however, on careful examination proved to be quite free from trinitrophenol. It was noticed that at the moment the gardenin came in contact with the nitric acid, it assumed a brilliant crimson colour before dissolving. The attempt made to isolate the red substance thus formed was ultimately successful. One part of gardenin was dissolved in about thirty times

its weight of boiling glacial acetic acid, and after being rapidly cooled, two parts of nitric acid of sp. gr. 1·45 were added to the clear solution. In a few seconds hair-like crimson needles began to form, very different in appearance from gardenin. At the expiration of five minutes the mixture, which was kept cold, had solidified to a pulp of needles. It was then mixed with about 150 parts of cold water, and the gelatinous precipitate collected after it had stood a few minutes. The pasty, red mass, after being well washed, was pressed into a cake, and removed from the filter before drying; for it was found that if allowed to dry on the filter, it adhered so firmly to the paper that it was very difficult to remove it. Gardenin yields nearly ninety per cent. of its weight of this substance, which is insoluble in water and dilute acids, but readily soluble in alkaline solutions, and re-precipitated on the addition of an acid. The authors have provisionally named it *gardenic acid*. It is free from nitrogen, and after being purified by boiling with spirit, in which it is but very slightly soluble, and crystallization from glacial acetic acid, it was found to melt at about 236°. If the nitric acid is allowed to act on the glacial acetic acid solution of gardenin for a considerable time, or on the gardenic acid itself, it becomes changed to an orange-coloured substance, much more soluble in alcohol than gardenic acid.

The authors expect a larger supply of dikamali resin, on receipt of which they intend to make a further investigation of these new compounds and other derivatives of gardenin.

Determination of Quinine in Cinchona Barks by means of the Polaristrobometer. A. C. Oudemans, jun. (*Chem. News*, 1877, 110, from *Archives Néerlandaises de Sciences Exactes et Naturelles*, tome xii., 1me livraison.) The author, in his memoir on the specific rotatory power of the principal cinchona alkaloids, expressed the opinion that the use of the polaristrobometer might become a useful adjunct in the quantitative analysis of mixtures of two or more of these alkaloids. He has now endeavoured to show by examples that the disturbing influences exerted by variations in the degree of concentration, or by the simultaneous presence of different alkaloids, are so slight that this method of determination gives results much more accurate than those obtained by purely chemical procedures. He finds that it is possible to determine by means of the polaristrobometer the amount of quinine in the mixed tartrates of quinine and cinchonidin, as obtained by precipitation from the solutions of the barks. His result is a refutation of the unfavourable opinion which Hesse has too precipitately passed (*Ann. der*

Chemie u. Pharm., clxvi., 230) on the utility of such determinations.

Volumetric Estimation of Quinine. H. Trimble. (*Amer. Journ. Pharm.*, 1877, 536.) For the ready estimation of quinine, for example in pills, and in many cases in which the quantity that should be present is approximately known, the author uses the following method, which is based on the intensity of colour produced when the alkaloid is treated with chlorine water and solution of ammonia.

First, a standard solution is prepared by taking 1 centigram of quinine, or one of its salts, dissolving it in about 5 c.c. of fresh chlorine water, adding 10 c.c. of solution of ammonia, and diluting this dark green liquid in a glass cylinder to 100 c.c.

In estimating a one-grain quinine pill, a similar cylinder is taken, into which is placed a fractional part of the solution obtained by treating the disintegrated pill with chlorine water and ammonia, and diluting with water until it exactly corresponds in colour with the standard solution, when the amount of quinine is found by calculation. By a little practice the results become surprisingly accurate, and the process requires very little time compared with the more exact gravimetric methods. It is true that quinidine, if present, interferes with the results; but it is not so liable to be fraudulently employed as the cheaper alkaloids.

The same process may probably be applicable also for the estimation of quinine and quinidine in cinchona barks.

Sulphosalicylate of Quinine. (*L'Orosi*, Jan., 1878, 7. From *New Remedies*, 1878, 103.) Cahours, in 1843, recognised the fact that salicylic acid combined with the vapour of sulphuric anhydride. Mendius, in 1857, studied this combination, and named it sulphosalicylic acid. Recently Schiff and Remsen have also found that this compound may be prepared by the action of concentrated sulphuric upon salicylic acid. Equivalent quantities of sulphuric acid (98 parts) and of salicylic acid (138 parts) are gently heated together, producing the new compound in form of a solid deliquescent mass, soluble in water, alcohol, and ether, from which solutions it is deposited on evaporation in long, prismatic needles. Ferric chloride imparts to the solution an intense red-wine colour, differing in this from salicylic acid, which strikes an intense violet.

The best starting-point for the preparation of sulphosalicylates of definite composition is the barium salt, which is easily obtained by saturating the hot compound acid with barium carbonate, filtering and (if the salt is desired in a solid condition) cooling or evapo-

rating the solution, when barium salicylate will crystallize out in hard, shining, monoclinic prisms, but little soluble in cold, quite soluble in hot water, and insoluble in alcohol. Its formula is $C_7 H_4 Ba S O_6 + 3 H_2O$; but by varying the temperature, or by concentrating the mother-waters left after the first crystallization, two other modifications of barium salicylate may be obtained, differing in crystalline shape, and probably in water of crystallization.

To prepare sulphosalicylate of quinine, a boiling hot solution of barium sulphosalicylate is exactly decomposed with a boiling solution of neutral quinine sulphate, whereby barium sulphate is precipitated. This is filtered off, and the filtrate (which generally has a roseate tint) cooled, when it becomes covered with a crust of crystals of the new quinine salt. By evaporating the mother-waters, and cooling, successive crops of crystals may be obtained.

Quinine sulphosalicylate is but little soluble in cold water, although after having been in contact with it for some time, it dissolves completely. In boiling water it is much more soluble, insoluble in absolute alcohol or ether, but soluble in ordinary alcohol and in chloroform.

Notes on the Determination of Quinine. A. B. Prescott. (*Amer. Journ. Pharm.*, Oct. 1877.)

1. *Gravimetric Determination of Quinine by Precipitation with Alkaline Hydrates.*—The author shows that the precipitation of quinine as a free alkaloid is inaccurate in quantitative work under any circumstances, and that, if there is much dissolved matter in the filtrate to be washed away, the operation gives no result of even approximate quantity. By measuring the filtrate with the washings, some notion of the loss may be gained, but this loss is varied by proportion of the precipitant, and may be varied by other dissolved bodies in the filtrate. Moreover, the precipitation of quinine by alkali in the preparation of citrate of iron and quinine is wasteful and inaccurate.

2. *Gravimetric Determination of Quinine as a Precipitate by Potassium Mercuric Iodine.*—The value of this precipitate, washed and dried at 212° F., was found to be 2·900 grams for 1 gram of quinine dried at the same temperature. This finding was the mean of three determinations, using Mayer's solution upon an acidulated sulphate solution of alkaloid,—the results being respectively 0·801, 0·824, and 0·812 of precipitate from 0·280 of alkaloid. Just 26 c.c. of Mayer's solution were required for the full precipitation of each portion ($26 \times 0{\cdot}0108 = 0{\cdot}2808$), after which 4 c.c. of the standard solution were added in each portion, to represent an excess of the reagent,

as convenient in a gravimetric operation. The quinine taken was Powers & Weightman's "pure quinine," which was found to lose $6\frac{2}{3}$ per cent. at 212° F.; so 0·300 gram was weighed in each portion to represent the 0·280 gram as dried at 212° F. The volume of Mayer's solution required for each, as given above, very nearly coincides with 0·280 of Mayer's quinine. Farther investigation is desirable as to presence and proportion of combined water in the residue of quinine at 212° F. Mr. A. H. Allen (*Pharm. Journ. and Trans.*, vi., 964, June 3, 1876) has reported the residue from ether solution to retain constant, at 212° F., 4·28 per cent. of combined water, a little less than that of a monohydrate. From this report, Mr. A. N. Palmer (*Pharm. Journ. and Trans.*, vii., 89, July 29, 1876) dissents, stating that a residue of constant weight can only be obtained at 260° to 270° F.

The precipitation by potassium mercuric iodide is very close, and bears water washing without weighable loss. The reagent need not be of standard strength for gravimetric results; it can be prepared simply by treating solution of corrosive chloride of mercury with solution of iodide of potassium until the precipitate at first formed is just all dissolved.

3. *Gravimetric Determination of Quinine as a Precipitate by Phosphomolybdate.*—This precipitate is exceedingly close in the case of quinine, and bears washing without loss, but does not bear a temperature above 158° F. (70° C.), without reduction of molybdenum, shown by a blue colour. The value of the precipitate, dried below 158° F. to a constant weight, was found, by Mr. Lobb, to be 3·665 grams for 1 gram of quinine as dried at 212° F. This result was the mean of two nearly identical determinations, 0·280 gram of the alkaloid giving respectively 1·026 and 1·0265 gram precipitate. The reagent, the acidulate solution of sodium phosphomolybdate, is added in slight excess, when the precipitate separates admirably.

4. *Solubility of Quinine Precipitate in Washed Ether.*—This was found by Mr. Lobb to be 20 parts of the ether for 1 part of the quinine (monohydrate) after twenty-four hours' digestion in a stoppered jar. A portion of the saturated ether solution was drawn into a specific gravity bottle and its weight obtained, then poured, with the ether rinsing, into a thin glass evaporating dish (tared), the ether evaporated, and the residue dried at 212° F. A constant weight was believed to be obtained, notwithstanding the difficulty of gain by hygroscopic water while weighing. The last four weighings were, for dish and contents, 26·895, 26·894, 26·893, 26·895. (See reference to Mr. Palmer in Note 2.) The residue of quinine

from ether solution is amorphous, and does not yield a perfectly crystallizable sulphate. Taking this residue as a monohydrate, nearly 21 parts of the *washed ether* are required to dissolve a precipitate of quinine, containing 1 part of anhydrous alkaloid.

The solubility of quinine in *ether* is given by Van der Burg at 23 parts (ether of sp. gr. 0·72 and 18° C.); by Merck at 60 parts; by Flückiger & Hanbury, 21 parts; by Hesse—for quinine trihydrate—at about an equal weight of ether; by J. Regnault, at 22·6 parts (15° C.).

Valuation of Trade Specimens of Citrate of Iron and Quinine. A. B. Prescott. (*Amer. Journ. Pharm.*, October, 1877.) The samples were obtained indiscriminately from different dispensing drug stores in Michigan. Only the *total alkaloid* was determined. This was done by extraction with chloroform, as follows:—A weighed portion of the scales was dissolved in water in a wide tube with a stopper, a small amount of tartaric acid was added (to prevent precipitation of ferric hydrate, a hindrance to the separation of chloroform), solution of sodium hydrate was added to produce alkaline reaction, and the liquid repeatedly shaken with successive portions of chloroform,—the chloroform being drawn off into a weighed beaker and evaporated until the residue of the last portion of the chloroform caused less than one milligram increase of weight to the beaker. The total residue in the beaker was now dissolved in water acidulated with sulphuric acid, the solution treated with a slight excess of sodium hydrate solution, then extracted with successive portions of chloroform, as before, and the residue from this solution was dried at 212° F. to a constant weight. This residue is given as the alkaloid, containing, according to Allen, 4·28 per cent. of water. The determinations were done by W. I. Holloway, in June, 1876, with the following results:—The samples gave,—

5·2 12·2 8·7 9·0 11·4 8·3 per cent. of alkaloid.

Each of these samples was found to contain sulphate. In three of them the quantities of sulphuric anhydride were found to be less than 1 per cent.; in the other three the quantities were found to be respectively 6·5, 3·5, and 1·8 per cent of the preparations. A sample of citrate of iron and ammonium, from the same manufacturer who furnished the sample of quinine iron citrate which had the 6·5 per cent. of sulphuric anhydride (above given), was found to contain 4·9 per cent. of sulphuric anhydride. A few ounces of solution of ferric sulphate were precipitated by ammonium hydrate, and the precipitate washed with water until the washings are

nearly tasteless, as the Pharmacopœia directs in the preparation of solution of citrate of iron, from which the three scale iron citrates are made. In this washed ferric hydrate, sulphate was found present, amounting, as sulphuric anhydride, to 14·8 per cent. of the drained moist precipitate. A sample of citrate of iron and quinine was made by the pharmacopœial process, except that the quinine sulphate was added, as such, without precipitating the alkaloid, and the scales were found to contain 4·3 per cent of sulphuric anhydride. By calculation all the sulphuric anhydride of the quinine sulphate cannot form over 1·8 per cent. of the scales of quinine iron citrate. If 10 per cent. of water be assumed in the scales, their percentage of sulphuric anhydride would be about 1·6. It will be remembered that the British Pharmacopœia, for preparation of iron citrates, directs to "wash the precipitate (ferric hydrate) with distilled water until that which passes through the filter ceases to give a precipitate with chloride of barium." Such is the well-known adhesion of ferric hydrate for alkali salts, that to wholly remove them requires long continued washing; but it is useless to wash away the sulphate from the quinine, thus losing from 2 to 11 per cent. of the alkaloid, and making the preparation uncertain in strength within the same limits, while taking a greater quantity of sulphate in the hydrated oxide of iron. Of course, after the solution takes place, any quantity of combined sulphuric acid present, if derived from the iron precipitate, will be *just as much* in combination with the quinine as though it had been introduced in quinine salt.

Note on the Extraction of Cinchonine. MM. Cazeneuve and Caillol. (*Répert. de Pharm.*, 1877, No. 12.) The authors propose to obtain cinchonine, not as a by-product in the manufacture of quinine, but directly from grey loxa bark, which is very rich in cinchonine. The powdered bark is mixed with its own weight of slaked lime, the mixture is packed into the displacer and exhausted with commercial ether. On evaporating off the latter, a residue of a yellowish white colour is left. This is taken up by boiling alcohol, and treated with a little animal charcoal, when it will, on evaporation, leave crystals of pure cinchonine. Cinchonine is ordinarily but little soluble in ether; but under the above conditions, when extracted by lime from the vegetable tissue, it is dissolved by it. Alcohol or chloroform dissolved by it are inconvenient, as they dissolve too much of the colouring matter.

The Hydrobromates of Cinchonine and Morphine. M. Latour. (*New Remedies*, from *Répert. de Pharm.*, 1877, No. 15.) *Hydrobromate of cinchonine* (*neutral*), $C_{20}H_{24}N_2O$, $2HBr = 470$, is soluble in

water at 15° C., in the proportion of 70 parts of the salt to 100 parts of water. 100 parts of alcohol of 90 per cent. dissolve 28·5 parts. It is best prepared by double decomposition between barium bromide and cinchonine sulphate. *Basic hydrobromate of cinchonine* $C_{20}H_{24}N_2O$, H Br, $H_2O = 407$. 1 part is soluble in 33·5 parts of water at 15° C. *Hydrobromate of morphine* may be prepared by double decomposition between sulphate of morphine and potassium bromide. It contains $C_{17}H_{19}NO_3$, H Br, $3H_2O = 420$. 1 part is soluble in 25 parts of water at 15° C.

Hydroderivatives of Cinchonine. Z. H. Skraup. (*Ber. der deutsch. chem.-Ges.*, xi., 311–315; *Journ. Chem. Soc.*, 1878, 434.) The chief products of the oxidation of cinchonine by potassium permanganate are cinchotenine and formic acid :—

$$\underset{\text{Cinchonine.}}{C_{19}H_{22}N_2O} + O_4 = \underset{\text{Cinchotenine.}}{C_{18}H_{20}N_2O_3} + CH_2O_2.$$

The hydrocinchonine, $C_{19}H_{24}N_2O$ (m. p. 267°), obtained as a by-product in this reaction (Caventon and Willm, *Ann. Chem. Pharm. Suppl.*, vii., 378), cannot be regarded as a true hydroderivative of cinchonine, since the action of nascent hydrogen on cinchonine gives rise to quite different products.

Zorn (*Journ. prakt. Chem.* [2], viii., 279) obtained two hydrocinchonines by the action of sodium amalgam on cinchonine, viz., a crystalline body, to which he gave the formula $C_{20}H_{26}N_2O$, and an amorphous substance, $C_{20}H_{28}N_2O$. Similar results are obtained with zinc and sulphuric acid, but the reaction is not so complete.

The action of nascent hydrogen does not convert the crystalline into the amorphous hydrocinchonine. The crystalline body is *dihydro-dicinchonine* $(C_{19}H_{22}N_2O)_2H_2$.

The amorphous hydrocinchonine was not obtained in a state of purity; it is deposited in the form of yellow tabular crystals, when caustic potash is added to a dilute solution of the body in hydrochloric acid.

In conclusion, the author expresses his belief that O. Hesse's homo-cinchonidine is identical with cinchonidine.

Simple Mode of preparing Cuprous Chloride. (*Pharmaceut. Centralhalle*, 1877, No. 40, from *Polyt. Notizbl.*, 16.) A hot solution of cupric sulphate is saturated with sodium chloride, and then boiled with small pieces of copper foil for ten minutes; after which the solution is poured hot upon a filter, and the filtrate allowed to run drop by drop into cold water. Cuprous chloride is thus precipitated as a snow white powder.

Volumetric Estimation of Tin. MM. Pellet and Allart. (*Pharmaceut. Centralhalle*, 1877, No. 50.) The hydrochloric acid solution, which must be free from iron, copper, and antimony, is mixed with a standard solution of ferric chloride until the mixture assumes a pale brown colour. The excess of ferric chloride is then determined by means of a titrated solution of stannous chloride. The reaction is explained by the following equation:—

$$Fe_2 Cl_6 + Sn Cl_2 = 2 Fe Cl_2 + Sn Cl_4.$$

Test for Santonin. D. Lindo. (*Chem. News*, Nov. 16th, 1877.) Place the santonin in a small, deep porcelain dish, and dissolve it (without heat) in concentrated sulphuric acid. Rubbing the crystals down with a glass rod greatly facilitates solution. Add highly dilute solution of perchloride of iron in small quantities at a time, and between each addition give the dish a pretty quick rotatory motion, while it is supported on a table. A fine red colour is first developed, which changes to a magnificent purple, and then to a splendid violet, as the sulphuric acid becomes more dilute. The heat produced by mixing the fluids is necessary to develop the colours.

When applying the test to small quantities of santonin a somewhat different method of proceeding must be adopted. The experiment in this case is best performed in a one-inch shallow porcelain capsule, with a thick flat bottom. Mix the highly dilute solution of perchloride of iron with an equal bulk of concentrated sulphuric acid, and add the mixture to the santonin. Heat must then be cautiously applied. The crystals of santonin will slowly dissolve, and the colour will be developed.

The capsule is conveniently supported on the blade of a spatula, and heated by a spirit lamp.

One drop of a solution of one grain of santonin in one fluid ounce of chloroform was evaporated to dryness in a small capsule, and the residue heated with a drop of the perchloride of iron and sulphuric acid mixture. A very fine reaction was obtained.

The separation of santonin from other organic matters would in most cases be a very difficult—and in many instances an impossible—thing to accomplish, owing to the facility with which it suffers decomposition.

In trying the experiment of separating santonin, by means of chloroform, from a powder containing rhubarb and santonin, the author noticed a change he had not seen mentioned before. The chloroform separated from the powder by filtration was evaporated to dryness, and the residue tested for santonin. The violet colour

was obtained very distinctly. He then tried the effect of the test, fluid on the colouring matter of rhubarb alone, as this is dissolved by chloroform. The test produced a reddish colour, not the violet or purple colour of santonin.

Thinking that in the case of rhubarb, the iron had nothing to do with the reaction, the author next tried the effect of *concentrated sulphuric acid alone* on the colouring matter of rhubarb. He found it produced a beautiful scarlet colour.

Estimation of Santonin in Levant Wormseed. Prof. G. Dragendorff. (*Archiv der Pharmacie*, April, 1878, 306.) The author recommends to digest for two hours 15 or 20 grams of the wormseed with 15 or 20 c.c. of a ten per cent. soda-lye and 200 c.c. of water. The liquid is filtered, the residue washed with distilled water, the filtrates united and concentrated in a water bath to about 30 or 40 c.c. After cooling, the liquid is neutralized with hydrochloric acid, immediately filtered, and the filter washed with 15 or 20 c.c. of water. The precipitate may be washed with an eight per cent. soda solution. If santonin crystals are formed on the filter, these are collected, and afterwards united with the remainder of the santonin. The filtrate, after the addition of more hydrochloric acid, is shaken three times with 15 or 20 c.c. of chloroform. The chloroform extractions are washed with water and distilled to dryness; the residue is dissolved in very little soda-lye, filtered if necessary, and the filter washed with a little water. The solution is then strongly acidulated with hydrochloric acid, and set aside in a cool place. Two or three days later the santonin may be collected on a filter, washed with 10 or 15 c.c. of eight per cent. soda solution, and, after drying at 110° C., weighed. For every 10 c.c. of aqueous liquid, from which the santonin was precipitated (not counting the wash water), there may be added to the weight of the santonin ·002 gram, and for every 10 c.c. of soda solution used for washing ·003 gram.

Process for Extracting Quinidine from Quinoidine of Commerce. Dr. de Vrij. (*Moniteur Scientifique Quesneville*, Dec., 1877. From *Chem. News*, Dec., 1877.) The hydrochloric solution of quinoidine is heated in the water bath, and mixed with a solution of caustic soda (containing 40 grams hydrate of soda per litre) to remove a black, resinous matter. From the solution remaining, the quinidine is separated either by means of tartaric acid or of potassium iodide. The author remarks that all the neutral salts of the cinchona alkaloids have an alkaline reaction.

Fraudulent Quinine. Dr. Pratesi. (*Pharmaceut. Zeitung*, Dec.

5th, 1877.) The preparation reported upon by the author, which is said to be of German origin, resembles sulphate of quinine in appearance, and in its behaviour to alcohol, ether, chloroform, and ammonia; but differs from it by its complete solubility in water, and its failure to produce a precipitate with barium chloride. When heated on platinum foil it burns, and gives off violet vapours. Its taste is bitter, but not so persistent as that of sulphate of quinine.

The Medicinal Chloro-Derivatives of Alcohol. (From a paper by J. Biel, in *Pharm. Zeit. für Russland*, 1877, No. 11, and a paper in *L'Union Pharmaceutique*, 1877, 181. *New Remedies*, October, 1877.) Among the chemicals which have been adopted into the list of medical agents, the chlorine-derivatives of alcohol occupy a very prominent place. Starting from the single chloroform, which came into use about 1831, their number has since then steadily increased, until there are now no less than about ten such compounds. Many of these are so closely allied in properties, that a sharp determination of boiling point and specific gravity is necessary to distinguish them. In determining the boiling point, it may be incidentally remarked, the thermometer must not dip into the liquid, but must be wholly immersed in the vapour of the boiling liquid, and the latter must be carefully distilled to dryness.

Chloral Hydrate.—Into a series of 30 to 40 large glass carboys, each of which contains 108 to 144 pounds of alcohol of 98 per cent., a current of chlorine gas, washed and dried by sulphuric acid, is passed without intermission for twelve to fourteen days. In the beginning of the operation the action is sufficiently energetic to necessitate the cooling of the carboys, while towards the end they must be warmed to 60° and 75° C. (140° to 167° F.). As soon as the liquid in the carboys has reached a specific gravity of 1·400, the chlorination is interrupted, the chlorinated alcohol is transferred to copper stills lined with lead, and carefully boiled with an equal weight of sulphuric acid. This causes the elimination of large quantities of *ethyl chloride* gas (hydrochloric ether, $C_2 H_5 Cl$), hydrochloric acid, and a whole series of by-products, which are condensed. After a while, chloral passes over, which boils at 94° C. (201·2° F.). A rise of the thermometer to 100° C. (212° F.) indicates that all chloral has passed over, and the distillation is stopped. The distilled chloral, a colourless liquid, is neutralized with chalk, again distilled, the distillate brought into contact with just sufficient water to form the solid hydrate, and rapidly cooled off. The mass thereby congeals, and forms the product known as "chloral hydrate in crusts." More recently this is being displaced

by chloral hydrate crystallized from boiling chloroform, which forms brilliant pellucid rhombohedra, and is much more capable of resisting change by exposure to air than the ordinary kind.

Soon after the discovery of chloral, a number of works on the largest scale were erected for its preparation; but competition soon lowered the market price of the product to such a degree that it became a question of life and existence with some manufacturers to find use for the large quantity of apparently useless by-products obtained. In this way Kraemer, of Berlin, who was supplied with material by Schering's factory, discovered in those accompanying products large quantities of *monochlorinated ethyl chloride*, or *dichlorethane* ($C_2H_4Cl_2$, ethyliden-chloride), and afterwards, together with Pinner, he discovered a new chloral, which was named *croton-chloral*, and which was examined therapeutically by Liebreich, who proved it to be a valuable agent. Kraemer also believed he had recognised in the mixture small quantities of *ethene chloride* ($C_2H_4Cl_2$, Dutch liquid); but this was disproved by Geuther, Stapf, and Staedel.

To arrive at a clear understanding of the origin of these secondary products, it is necessary to study the chemical reactions occurring during the generation of chloral:—

Chlorine acting upon anhydrous alcohol produces in the first place *aldehyde*,—

$$C_2H_6O + Cl_2 = C_2H_4O + 2HCl$$
alcohol + chlorine = *aldehyde* + hydrochloric acid.

This, with more alcohol, forms *acetal*,—

$$C_2H_4O + 2C_2H_6O = C_2H_4(C_2H_5O)_2 + H_2O$$
aldehyde + alcohol = *acetal* + water,

which, by substitution of chlorine for hydrogen, forms *trichloracetal*,—

$$C_2H_4(C_2H_5O)_2 + Cl_6 = C_2HCl_3(C_2H_5O)_2 + 3HCl$$
acetal chlorine = *trichloracetal* + hydrochloric acid.

This yields, with the generated hydrochloric acid, *chloral alcoholate* and *ethyl chloride*,—

$$C_2HCl_3(C_2H_5O)_2 + HCl = C_2HCl_3(C_2H_6O_2) + C_2H_5Cl$$
trichloracetal + hydrochloric acid = *chloral alcoholate* + *ethyl chloride*.

Most of the latter is decomposed with some of the still present alcohol to *ether*,—

$C_2H_5Cl + C_2H_6O_2 = (C_2H_5)_2O + HCl$
ethyl chloride + alcohol = *ether* + hydrochloric acid,

which is converted by fresh chlorine into mono-, bi-, tri-, and finally into *tetrachlorinated* (*ethylic*) *ether*,—

$(C_2H_5)_2O$ or $C_2H_5.O.C_2H_5$ + $4Cl_2$ = $C_4H_6Cl_4O$ or $C_2H_5.O.C_2HCl_4$ + $4HCl$
ether + chlorine = *tetrachlorinated ether* + hydrochloric acid.

During the subsequent distillation with concentrated sulphuric acid, the generated chloral alcoholate splits into *chloral* and *ethyl sulphuric acid*,—

$C_2HCl_3(C_2H_6O_2) + H_2SO_4 = C_2HCl_3O + H_2O + (C_2H_5)HSO_4$
chloral alcoholate + sulphuric acid = chloral + water + *ethyl-sulphuric acid*,

and the tetrachlorinated ether undergoes the same change,—

$C_2H_5.O.C_2HCl_4 + H_2SO_4 =$
tetrachlorinated ether + sulphuric acid =
$C_2HCl_3O + HCl + (C_2H_5)HSO_4$
chloral + hydrochloric acid + *ethyl-sulphuric acid*,

and the ethyl-sulphuric reacts with muriatic acid to form *sulphuric acid* and *ethyl chloride*,—

$(C_2H_5)HSO_4 + HCl = H_2SO_4 + C_2H_5Cl$
ethyl-sulphuric acid + hydrochloric acid = sulphuric acid + *ethyl chloride*.

On the other hand, if chlorine continues to act upon tetrachlorinated ether, there is produced *pentachlorinated ether*, $C_2H_5.O-C_2Cl_5$, which has a specific gravity of 1·650, and *does not yield chloral* when treated with sulphuric acid. This is the reason why, in the manufacture of chloral, the current of chlorine gas is interrupted when the liquid in the carboys has reached a specific gravity of 1·400.

From the *ethyl chloride* generated during the process, chlorine produces the following substitution-products :—

C_2H_5Cl, ethyl chloride, or chlorethane);
$C_2H_4Cl_2$, di-chlorethane (ethyliden chloride);
$C_2H_3Cl_3$, tri-chlorethane;
$C_2H_2Cl_4$, tetra-chlorethane;
C_2HCl_5, penta-chlorethane;
C_2Cl_6, carbon hexachloride, or rather carbon trichloride, a crys-

talline substance identical with that produced by the action of chlorine gas upon the Dutch liquid.

A very variable mixture of the middle members of this series is at present an article of commerce under the name of *liquor anæstheticus*. Another similar mixture, containing the lower members, is the *æther anæstheticus Aranii*, boiling between 64° and 100° C. (140°–212° F.); and the *æther anæstheticus Wiggers*, which contains the higher chlorides, and boils between 100° and 140° C. (212°–284° F.).

As regards the other chloral, *croton-chloral*, or, as it is now more correctly termed, *butyl-chloral*, investigation has not yet led to such detailed results. The authors are, however, certain that it is produced by the chlorination of two associated molecules of aldehyde. As croton-chloral, its formula would be $C_4H_3Cl_3O$; but as butyl-chloral, its formula is $C_4H_5Cl_3O$. Croton-chloral is distinguished from the ordinary chloral, first, by its melting point, which is at 78° C. (173° F.), while common chloral melts at 56° C. (133° F.); and second, by the products of its decomposition. *Ethyl chloral*, when brought into contact with alkalies, splits into *chloroform* and *formic acid*:—

$$C_2HCl_3O + KHO = CHCl_3 + KCHO_2$$

ethyl-chloral + potash = *chloroform* + potassium *formate*;

while *croton-chloral*, under the same conditions, splits into *dichlorallylene* and *formic acid*,—

$$C_4H_3Cl_3O + 2KHO =$$

croton-chloral + potash =

$$C_3H_2Cl_2 + KCl + KCHO + H_2O$$

dichlorallylene + potassium chloride + potassium *formate* + water.

Dichlorallylene is an aromatic liquid, boiling at 78° C. (172° F.), but is very unstable, being gradually decomposed, even at ordinary temperatures, acquiring a disagreeable odour, and setting free hydrochloric acid gas. The same phenomena are observed in impure samples of chloroform, and the readiness with which the latter decomposes and becomes acid, makes it highly probable that this is owing to a contamination with dichlorallylene. Its presence is easily accounted for by the fact that many manufacturers prepare chloroform from crude alcohol, which contains considerable quantities of *aldehyde*. The latter is converted into croton-chloral, and this by contact with the chalk during the rectification into dichlorallylene.

If we, however, accept the new views of the constitution of croton-chloral, according to which it is in reality *butyl-chloral*, we should have the following products of decomposition :—

	$C_4H_5Cl_3O$	+	$2KHO$	=		
	butyl-chloral	+	potash	=		
$C_3H_4Cl_2$	+ KCl	+	$KCHO_2$	+	H_2O	
dichloride of allylene	+ potassium chloride	+	potassium *formate*	+	water,	

and in this case dichloride of allylene is just as unstable as the dichlorallylene mentioned previously, so that the deterioration of chloroform may be owing to the presence of either compound.

Now, since, in the preparation of chloroform from alcohol and chlorinated lime, the intermediate formation of chloral is generally accepted as a fact, it was supposed that an absolutely pure chloroform could be produced by decomposing pure chloral hydrate with alkalies; and this idea was actually carried out in practice, very large quantities of such chloroform being manufactured in Germany, chiefly by Saame & Co., in Ludwigshafen. Unfortunately, however, the expectation of its superior purity and stability has not been realized. It costs a good deal more than ordinary chloroform, but it is not by any means more stable than the latter. Of three samples of chloroform (one of which was prepared from chloral) which were exposed to the sunlight in half-filled bottles, one sample, consisting of ordinary, and the sample of chloral-chloroform, were decomposed with equal rapidity; while the third sample, being purified ordinary chloroform, remained unaltered even after standing six months.

In connection with the above-mentioned compounds, which are mostly derived from the ethyl series, may be mentioned another substance, also used as an anæsthetic, and frequently as a substitute for chloroform. This is the compound CH_2Cl_2, methene chloride, or dichloromethane, usually called *bichloride of methylene*. The chemistry of the latter may be briefly explained as follows: The starting point of the methyl series is the saturated hydrocarbon CH_4, methane or marsh-gas, an incondensable gas of sp. gr. 0·559. Chlorine does not act upon it in the dark; in diffused daylight it displaces one atom of hydrogen, forming methyl chloride, or chloromethane :—

$$CH_4 + Cl_2 = CH_3Cl + HCl.$$

This latter body, however, may be more easily prepared by heating a mixture of two parts of sodium chloride, one part of methylic

alcohol, and three parts of sulphuric acid. It is a colourless gas of a sweetish taste and peculiar ethereal odour. The presence of an excess of chlorine successively causes the replacement of more atoms of hydrogen by chlorine, so that we have the following series :—

$C H_4$, methane ;

$C H_3 Cl$, methyl chloride, chloromethane ;

$C H_2 Cl_2$, methane chloride, dichloromethane (*bichloride of methylene*) ;

$C H Cl_3$, methenyl chloride, trichloromethane (*chloroform*) ;

$C Cl_4$, carbon tetrachloride.

The third compound of this series, the commercial *bichloride of methylen*, is generally prepared by exposing to daylight in a glass globe chlorine gas, and gaseous methyl chloride. The globe is provided with two lateral tubes for the admission of the gasses, and below with an open neck, which communicates with one of the tubulures of a Woulff's bottle, of which the other tubulure communicates by means of a bent tube with another Woulff's bottle, and this by another bent tube with a flask. The second bottle is surrounded with ice, and the flask immersed in a freezing mixture to condense the volatile products. The bichloride condenses in the flask in a pure state, while the contents of the two Woulff's bottles consist chiefly of chloroform.

Methene chloride, or, to retain the less correct term, *bichloride of methylene*, is therefore rather troublesome to prepare, and higher in price than chloroform, which latter may be prepared in many ways, starting from methyl, ethyl, or even amyl alcohols. Hence it is not uncommon to find chloroform substituted and sold for the other more expensive anæsthetic. They may, however, be distinguished by their boiling points and specific gravities : chloroform has a sp. gr. of 1492 at 17° C. (62·6° F.), and boils at 63·5° C. (146° F. according to Pierre, but 142° F. according to U. S. Ph.) bichloride of methylene has a sp. gr. of 1360, and boils at 41° C. (106° F.) [Not at 30·5° C. (87° F.) as Fownes has it. This is the boiling point of the isomer of bichloride of methylene, namely, chlorinated methyl chloride $C H_2 Cl_2$, which has a sp. gr. of 1344]. A further distinction is their behaviour to a flame ; chloroform burns with difficulty with a green-bordered flame, while the other liquid burns with a smoky flame. A solution of iodine in chloroform has a reddish violet colour, while a solution in bichloride of methylene looks more like an alcoholic tincture. It has also happened that chloroform mixed with alcohol, to reduce the specific gravity, has been substituted and sold for the bichloride. This

fraud may, however, easily be detected by shaking it with water, which removes the alcohol.

Chemical Examination of Ginger. J. Stenhouse and C. E. Groves. (From *Journ. Chem. Soc.*, 1877.) The ground ginger, *Zingiber officinale*, from Cochin China, was extracted by boiling with alcohol, and the solution evaporated after filtration. The viscid residue had a strong odour of ginger, and when heated in a current of steam yielded a small quantity of essential oil lighter than water. A portion of the extract was fused with three times its weight of soda, and the product neutralized with sulphuric acid, and extracted with ether in the usual way. The ethereal solution, on evaporation, left a mass of crystals impregnated with a dark coloured liquid; these after purification by pressure and two or three recrystallizations from water, were examined and proved to be protocatechuic acid. They gave the ordinary well-known reactions of protocatechuic acid, and fused at the same temperature. On heating them with excess of bromine in a sealed tube, carbonic anhydride and tetrabromopyrocatechin were formed.

Berberine Phosphate. H. B. Parsons. (From the *Proceedings of the Michigan Pharmaceutical Association.*) There has been a considerable call during the past year for a freely soluble salt of berberine, to be used as a topical application to inflamed mucous membranes. The muriate and acid sulphate are so nearly insoluble as to be of little service. The phosphate and hypophosphite are freely soluble, but their preparation is expensive, owing to the high price of phosphoric and hypophosphorous acids. Accordingly, many spurious phosphates are now upon the market, most of which consist, wholly or in part, of the acid sulphate.

Quantitative analyses of commercial samples of the acid sulphate, and of a so-called "phosphate of hydrastine," gave the following results, one gram being taken in each case:—

	Acid Sulphate.	"Phosphate."
Berberine ($C_{20}H_{17}NO_4$) . .	·7650	·7969
Sulphuric Acid (H_2SO_4) . .	·2250	·1343
Phosphate of Calcium, $Ca_3(PO_4)_2$	—	·0600
	·9900	·9912

The first salt was a true acid sulphate, and was sold as such; the analysis confirms the formula already given by Perrin: $C_{20}H_{17}NO_4H_2SO_4$ (*Journ. Chem. Soc.*, xv., 339).

The "hydrastine phosphate" contained no hydrastia, which is a *white* alkaloid, found together with berberine in the root of *Hydrastis*

Canadiensis. Only a trace of phosphoric acid was present, and that as calcium phosphate.

Several other phosphates were examined. A sample of the true phosphate, made by precipitation, was found quite acid, because imperfectly washed. A Cincinnati "phosphate of hydrastine" consisted of a sticky, greenish mass, containing much extractive organic matter, the remainder being sulphate of berberine. It was only partially soluble in much hot water, was very acid, and entirely unfit for medicinal uses.

By studying the reactions of berberine sulphate with the various phosphates of calcium, the author found that a *soluble* phosphate of calcium, if boiled with berberine sulphate, forms berberine phosphate and calcium sulphate. By repeated experiments, he finds the following process to give satisfactory results:—

Bone Ash, well burned	1 troy oz.
Sulphuric Acid, concent	gr. clxxxv.
Berberine Sulphate	1 troy oz.
Alcohol,	
Water	āā q.s.

Mix the bone ash with one fluid ounce of water, add the sulphuric acid, stir well, add eight or ten fluid ounces more of water, boil for twenty minutes, strain through fine muslin. To the filtrate add the berberine sulphate, and evaporate to dryness on the steam bath. Pulverise the residue, and treat several times with boiling diluted alcohol. Filter, and allow the filtrate to drop into cold alcohol. The yellow precipitate thus formed is to be dried on filter paper with a gentle heat. More of the phosphate may be obtained by concentrating the alcoholic mother-liquor.

As thus prepared, phosphate of berberine is a canary yellow powder, very freely soluble in water, moderately soluble in cold diluted alcohol and in hot alcohol, slightly soluble in cold alcohol. The process proposed is a cheap one, and yields a very pure phosphate.

Note on the so-called Citrate and Valerianate of Caffeine. P. J. Haaxmann. (*Répert. de Pharm.*, 1877, 142.) Hager's statement that caffeine does not combine with citric acid, and that the citrate of caffeine of commerce is nothing but the alkaloid with a small amount of free citric acid, is fully confirmed by the author, who has also extended his experiments to the valerianate with the same results. From the solution of caffeine in valerianic acid, he obtained crystals of the alkaloid which, when washed with cold water,

retained but a minute quantity of the acid, just sufficient to be recognisable by its odour.

The Fusing Point of Santonin. H. Leroy. (*Répert. de Pharm.*, 1878, 104.) The discrepancies in the statements of the French and German Pharmacopœias in reference to the fusing point of this substance induced the author to reinvestigate the subject. He examined pure santonin prepared by himself, and also commercial samples, and found both to fuse at 170·5° C. The French Codex gives the fusing point as 136° C., and the German Pharmacopœia as 170° C.

The Alkaloids of Pao-Pereiro Bark. Dr. O. Hesse. (*Pharm. Journ.*, from *Ber. der deutsch. chem.-Ges.*, x., 2162.) The presence of an alkaloid in pereiro bark, also called pingnaciba and canudo amargoso, which in Brazil has a reputation as a febrifuge, was announced by Correa dos Santos, and its occurrence was confirmed by Goos (*Répert. f. Pharm.*, lxxvi., 32) in 1838. Goos described it as amorphous, but subsequently Peretti (*Journ. Chim. Méd.*, xxvi., 162) observed that it was capable of separating from ether or alcohol in granules, and consequently probably of crystallization. Rochefontaine and De Treitas (*Compt. Rendus*, lxxxv., 412) have recently studied the action of this alkaloid upon different animals, and found that it has considerable toxic power. The latter authors also suggested that the name of "pereirine" at present used for the alkaloid in question, should be changed to "geissopermine," in order to recall the origin of the alkaloid.

According to Peckholt, the tree yielding pao-pereiro bark (not pao-pereira, as it is usually erroneously spelt) is the *Geissospermum Vellosii*, and according to Baillon the *Geissospermum lævе;* consequently it is one of the Apocynaceæ.

The author has also engaged in the investigation of this subject, and last June informed Professor Wiggers that the bark contained several alkaloids, one of which was distinguished from the others by its difficult solubility in ether. This alkaloid he has named "geissospermine."

Geissospermine forms small white prisms, truncated at both ends. It dissolves readily in alcohol, but is nearly insoluble in water and in ether. It is freely soluble in dilute acids, and from such solutions it is again precipitated by an excess of ammonia or sodium hydrate. The precipitate at first consists of amorphous white flocks, which are quickly transformed into small crystals.

The hydrochloric solution of geissospermine gives with platinic chloride a pale yellow amorphous precipitate; with gold chloride it

gives a brown yellow precipitate, no reduction of the metal taking place in this case.

Concentrated nitric acid dissolves geissospermine with a purple-red colour, which at the ordinary temperature continues for a considerable time; but after heating the colour immediately disappears, passing into orange-yellow. Pure concentrated sulphuric acid dissolves the alkaloid colourless; but after a few seconds the solution becomes bluish, afterwards blue, and at last again pale. Ordinary concentrated sulphuric, or acid containing oxide of iron, also dissolves the alkaloid with a more or less intense blue colour, which eventually becomes pale. Sulphuric acid containing molybdic acid, on the other hand, dissolves it with a dark blue colour, which retains the same intensity as at first, even after twenty-four hours. Concentrated hydrochloric acid produces no colour reaction with geissospermine. When heated with a little soda lime, geissospermine yields a substance that sublimes in light yellow delicate scales, which are freely soluble in ether, and dissolve without colour in concentrated nitric acid, but with a beautiful blue colour in sulphuric acid containing molybdic acid.

The crystalline geissospermine contains water of crystallization, which passes off at 100° C., the substance then becoming coloured faintly yellow. At a higher temperature, the alkaloid becomes more coloured, and melts at 160°, forming a brown liquid that solidifies amorphous upon cooling.

The alkaloid deviates the plane of polarized light to the left; amounting for the hydrate dissolved in 97 per cent. alcohol, with $p = 1{\cdot}5$ and $t = 15°$ C. to $(x)_p = -93{\cdot}37°$.

Finally, the formula of anhydrous geissospermine, dried at 100° C., is $C_{19}H_{24}N_2O_2$; that of the hydrate, or the crystalline air-dried alkaloid, is $C_{19}H_{24}N_2O_2 + H_2O$; and that of the platinum salt dried at 130° C., is $(C_{19}H_{24}N_2O_2HCl)_2 + Pt.Cl_4$.

A second alkaloid from pereiro bark forms a greyish white amorphous powder, very easily soluble in ether. It is coloured blood red by concentrated nitric acid, and violet-red by pure sulphuric acid. It corresponds best with the notices of Goos and others respecting pereirine, which name should therefore be retained for it. This alkaloid is apparently contained in the bark in preponderating proportions.

The author intends further to investigate both these alkaloids, and especially to ascertain whether they are contained in the leaves of pao-pereiro, which Wiggers has received from Rio Janeiro, under the name of *Folia Curobæ*.

Determination of the Nitrogen Compounds occurring in Commercial Sulphuric Acid. G. E. Davis. (*Chem. News*, xxxvii., 45.) The process employed by the author is a modification of Walter Crum's method of estimating nitrates in potable water, and is conducted as follows :—1 c.c. of the vitriol is measured very accurately by means of a fine pipette, and introduced into Frankland's stopcock tube, standing over mercury. By opening the stopcock the vitriol is allowed to run in, and the cup is washed out with *pure* strong vitriol, which is also run into the tube. The bottom is now closed with the thumb, and the vitriol agitated with the mercury in such a manner that an unbroken column of mercury always remains between the vitriol and the thumb. By this proceeding the mercury reduces the trioxide and tetroxide of nitrogen to the form of nitric oxide, and the whole of the nitrogen compounds being thus obtained in a common gaseous form, nothing remains but to read off the volume and apply the usual corrections. The reaction is completed in less than five minutes.

It is rather a curious coincidence that when 1 c.c. of vitriol is taken, the number of c.c. of N O obtained divided by ten gives almost exactly the percentage of N_2O_3. This happens when the vitriol has a density of about 143° F.

The Elimination of Alcohol. Prof. Binz. (*Archiv fur exper. Pathologie*, vi., 287.) The author has used Geissler's vaporimeter in reinvestigating the elimination of alcohol by the kidneys and lungs. The instrument is a very delicate indicator of alcohol, permitting the detection of as little as ·05 per cent. of this substance. He found that patients suffering from various febrile disorders, excreted by the kidneys during the eight or nine hours after doses of alcohol had been given not more than 3·1 per cent of the total quantity, and in some cases no alcohol could be found. It also appears from these experiments, that practically no alcohol escapes by the breath, even when large quantities are taken; and hence it is concluded that by far the larger part of the alcohol is burnt up in the body in the processes of metamorphosis of the tissues.

Action of Perchloride of Iron and Concentrated Sulphuric Acid on Some of the Opium Alkaloids. D. Lindo. (*Chem. News*, April, 1878, 158.) If a little codeine is placed in a small dry test tube, dissolved in concentrated sulphuric acid *without* the aid of heat, and a drop of solution of perchloride of iron added, the latter will float on the surface of the mixture without giving rise to any characteristic colour; but on applying a gentle heat below the line of contact, and shaking the tube slightly, the fluid acquires an

intense and magnificent blue colour, very similar to that produced by ammonia with salts of copper. The tube should not be more than one-fourth full. Morphine treated in the same way gives rise to an intense *indigo* blue coloration. Seen by candle light these colours appear violet.

On adding water to either of these solutions, the blue colour disappears. The fluid acquires a yellowish red colour, which is deeper with morphia than codeia.

Very small quantities of the alkaloids should be used in these experiments, or the colour will be so intense that the fluid will appear opaque; in which case, however, the addition of more concentrated sulphuric acid will render the tint apparent. The blue colour remains permanent, but gradually changes on the suface from absorption of moisture.

Some Reactions with Lindo's Test for Opium Bases. Prof. How. (*Chem. News*, xxxvii., 244.) The author records the following reactions, obtained precisely in the way detailed by Mr. Lindo (see the foregoing article):—

Papaverine dissolves in H_2SO_4 to a pale purple fluid, which becomes very pale and then brownish on standing about an hour. The addition of Fe_2Cl_6 and warming cause the purple colour to change quickly to yellow, while the liquid becomes turbid; the addition of water gives a colourless liquid, becoming pale yellow next day.

Narcotine dissolves to a bright yellow liquid, becoming orange on standing about an hour; then, treated as above, a blood red is produced, soon assuming a purplish tinge, then a bright red, resembling the ferric sulphocyanide, and remaining permanent at least for a fortnight.

Cotarnine gives first a clear, dark brownish yellow solution; then, with Fe_2Cl_6, a whitish precipitate, dissolving to a dark red fluid, which, with water, assumes much of the colour obtained with narcotine, but perhaps paler. It is equally permanent.

Narceine dissolves to an orange liquid, which becomes turbid and purplish, and finally of a pale red colour.

Strychnine dissolves to a colourless fluid, and affords successively a clear yellow and a colourless liquid.

Brucine gives first a pale amethystine solution, then orange-yellow or red-yellow looking across the tube, and red on looking down it; on further solution an amethystine red, becoming pale, but still distinct, at the end of a fortnight.

Caffeine gives successively a colourless, a bright yellow, and a colourless fluid.

Piperin dissolves to a deep red, nearly black, fluid, with a flocky deposit on heating with $Fe_2 Cl_6$; the addition of water gives a yellow fluid, the deposit appearing dark brown; the fluid was nearly colourless the next morning.

Betulin gives a dirty green-brown fluid, becoming clear and colourless with water.

Coumarin gives an orange-yellow clear fluid, which water renders very pale yellow.

Phloridzin (from bark of stem and roots of the apple-tree) dissolves to a blood red liquid, which is orange coloured at first, if very little of the substance is used; water gives a small flocky precipitate, and leaves the solution of an orange colour.

Quinine sulphate, of commerce, dissolves to a pale yellow fluid, which turns deeper yellow when warmed with $Fe_2 Cl_6$, and colourless with water.

Cinchonine, impure, gives clear yellow, turbid yellow, and yellowish liquids.

Beberine sulphate, in brown scales, dissolves to a very dark liquid, becoming red with more $H_2 S O_4$; with $Fe_2 Cl_6$ and warming, a dark green fluid—as seen over white paper—is produced, which gives with water a dirty yellow liquid.

Note on Boettger's Test for Glucose. O. Maschke. (*Zeitschr. für anal. Chem.*, 1877, 425. From *New Remedies.*) The author precedes this test for the detection of glucose in urine by the precipitation of albumen or other proteids by means of a solution of sodium tungstate strongly acidified with acetic acid, as the complete absence of all albuminoids is an essential condition to the success of the test. A sample of the urine is mixed with $\frac{1}{4}$ to $\frac{1}{3}$ the volume of the sodium tungstate solution, and the liquid is filtered after a few minutes (if a precipitate was produced). In case of an abundant precipitate, the filtrate must be tested with a new portion of the reagent, to make sure that the precipitation was complete. The clear filtrate, freed from albumen, etc., is then mixed with half its volume of solution of soda (or an equal volume of solution of sodium carbonate), and a small quantity of bismuth subnitrate—about as much as half a pepper seed—is added. Without regard to any violet, blue, or green coloration, which is often produced immediately, the mixture is first well shaken, and the bismuth allowed to settle. If the latter has assumed a grey, brown, or black colour, the urine contains alkaline sulphides ($Na_2 S$), which must be removed. In this case a new portion of urine is slightly acidified with acetic acid, and briskly shaken up with a small quantity of

bismuth subnitrate. It is then filtered, and afterwards, if necessary, freed from the albumen by the above process.

To bring about the reaction with glucose, the mixture of urine, soda solution, and bismuth subnitrate must now be boiled. In presence of much glucose an immediate browning of the mixture will be observed, and the boiling may soon be interrupted. Traces of glucose, however, can only be detected by protracted boiling. The reduced black bismuth is generally deposited last, so as to form a layer over any remaining undecomposed bismuth oxide. This reaction is capable of showing the presence of as small a quantity as $\frac{1}{100}$ per cent. of glucose in urine; and since glucose appears to be a normal constituent of urine, although only present in traces, it might become a question of doubt whether a particular kind of urine is diabetic or not. It may, however, be safely assumed that no urine should be considered diabetic (specific gravity and quantity being normal) unless abundant reduction of the bismuth salt takes place before the actual boiling of the test liquid mixed with the urine.

Estimation of Sugar. R. Sachsse. (*Journ. Chem. Soc.*, 1877, 226, from *Chem. Central.*) 18 grams of pure and dry mercuric iodide and 25 grams of potassium iodide are dissolved in water; a solution of 80 grams of caustic potash is added, and the whole is made up to 1 litre. 40 c.c. of this solution ($= 0{\cdot}72$ gram HgI_2) are boiled in a basin, and a solution of pure grape sugar is run in until the whole of the mercury is precipitated. The final point is determined by spotting a drop of the supernatant liquid on a white slab, and there bringing it into contact with a drop of a strongly alkaline solution of stannous chloride. The production of a brown colour shows the presence of unprecipitated mercury.

The author finds that the prepared mercury solution acts in different ways towards inverted and towards grape sugar. Fehling's copper solution has the same action on both. By standardizing the prepared mercury solution against pure grape sugar, and also against inverted sugar, it is possible to determine the quantities of these sugars simultaneously present in a liquid. It is only necessary to determine the number of cubic centimeters of the liquid required to precipitate completely the mercury from 40 c.c. of the standard solution, and then to determine by means of Fehling's solution the quantity of sugar of the formula $C_6H_{12}O_6$ which is present in the liquid under examination.

The necessary calculation is made on the principles of indirect analysis. So also it is possible to determine whether a substance which is without direct reducing action is cane sugar or dextrin.

It is only necessary to invert by boiling with acid, and to make two determinations—one with the standard mercury solution, the other with Fehling's solution: the presence of inverted sugar points to cane sugar, that of grape sugar to dextrin, in the original liquid.

Estimation of Grape Sugar, with special reference to the Method of R. Sachsse. F. Strohmer and A. Klaus. (From *Chem. Central.*, 1877, 697–703, 720.) The authors have compared Sachsse's process (see the foregoing article) with Fehling's method, and have arrived at the following conclusions:—

1. Sachsse's process is correct, if applied to the determination of dextrose in solutions of pure dextrose; and has this advantage over Fehling's method, that the end point is much more easily recognised.

2. In estimating dextrose in presence of saccharose with Fehling's solution, the estimation is the more correct the smaller the quantity of the saccharose present; for in presence of dextrose cane sugar is decomposed to a greater extent by Fehling's solution than when no dextrose is present.

3. For this last-mentioned estimation, Sachsse's process is quite inapplicable.

4. Sachsse's method may be used for determining inverted sugar in pure solutions.

In analysing the mixture of sugars obtained from starch, Fehling's method has been almost exclusively employed. The authors corroborate Heinzerling and Rumpff's statement that Fehling's solution is without material action on erythro- and achro-dextrin, which are the constituents of commercial dextrin. Sachsse's process cannot, however, be used for this purpose, as the mercury is precipitated when the solution is boiled with dextrin; it is therefore of use only for the determination of dextrose and inverted sugar in pure solutions of these bodies.

Nucin or Juglon. C. Reischauer. (*Ber. der deutsch. chem.-Ges.*, x., 1542–1548.) Nucine is a body prepared from the green shells of walnuts (*Juglans regia*). The numbers obtained in the author's analysis lead to the formula $C_{36}H_{12}O_{10}$. On mixing its alcoholic solution with a solution of neutral acetate of copper, a red coloration and a copious precipitate of bronze coloured microscopic crystals is obtained, which have a metallic lustre, and when dried at 100° C. were found to contain 15·83 per cent. of copper.

The Alkaloids of Sabadilla. O. Hesse. (*Liebig's Annalen*, No. 192, 1.) The author deduces from the figures obtained by Weigelin, Schmidt, and Köppen, who had analyzed the three alka-

loids, sabadilline, sabatrine, and veratrine, much simpler formulæ than had been assigned to them by these experimenters. According to the author, the three alkaloids with their formulæ are:—sabadilline, $C_{21} H_{35} N O_7$; sabatrine, $C_{26} H_{45} N O_9$; veratrine, $C_{32} H_{51} N O_9$.

The Characters of Conine. A. Petit. (*Pharm. Journ.*, from *Journal de Pharmacie* [4], xxvi., 200.) The author having had occasion to prepare a large quantity of conine according to the process of the Codex, has taken the opportunity of studying the properties of this alkaloid. The results that he has obtained as to the boiling point, density, and rotatory power, differ considerably from those of other authors. He has also arrived at the conclusion that the rotatory power cannot be depended upon as an indication of the purity of the alkaloid, or of the degree of dilution when it is diluted. Commercial conine is not as a rule diluted, except by a mixture of water and alcohol. Specimens examined contained only slight traces of methyl-conine; whilst the rotatory power of conhydrine differs but little from that of conine.

The product from a large operation was distilled in a current of hydrogen. Three liquids were thus separated: (A) passing over between 130° and 140° C.; (B) passing over between 160° and 170°; and (C), the greater portion, passing over at 170°. The operation was stopped at 172°, at which point conhydrine began to distil over. The third portion (C) consisted of pure conine, the hydrochlorate and sulphate giving very closely the theoretical quantity of chlorine and sulphuric acid respectively; it was therefore used in the subsequent experiments.

The boiling point of pure conine, at the ordinary pressure, according to the author, is 170° C. Other experimenters have attributed to it figures ranging between 136·5° (Wertheim) and 212° C. (Ortigossa), the latter being the boiling point given in the Codex and by most authors. Blyth, however, has placed it between 168° and 171° C.

The density attributed to conine by Gerhardt, Pelouze, and Wurtz, was 0·878; and by Berthelot and Dragendorff, 0·89. The following were the results obtained by the author, operating at a temperature of 12° C.:—

Product A	0·869
,, B	0·850
,, C (pure conine)	0·846

Examined with the sodium light, the rotatory power of pure conine freshly prepared was found to equal + 20·7°; but after

keeping the preparation eight days, this had diminished to equal + 10·36°. Chloroform, used as a solvent, diminished the rotatory power of conine, but to a much less degree than alcohol. Ether, oil, and benzol are without action in this respect.

Pure conine (product C) can be preserved a long time without alteration. Combined directly with hydrobromic acid, or hydrochloric acid, it forms, with the greatest facility, very stable salts, that remain unaltered at 100° C., or even 120° C. The best method of preparing them is to employ the conine distilled in a current of hydrogen and colourless, and add to it a very slight excess of hydrobromic or hydrochloric acid. Upon evaporating slowly over a water bath, fine perfectly white crystals of the hydrobromate or hydrochlorate are obtained. The insoluble modification of hydrobromate of conine, noticed by Mourrut as being formed when the temperature was raised above 60°, was not observed by the author to more than a most trifling extent. Crystals of hydrobromate of conine, dissolved in distilled water, formed a clear colourless solution, which, when heated during half an hour to 100°, gave no precipitate. Both the hydrobromate and the hydrochlorate of conine are anhydrous.

The hydrobromate of conine is soluble in two parts of alcohol, and the hydrochlorate in three parts.

A specimen of conine, obtained from a German source, was found by the author to agree with pure conine prepared by himself, as to the boiling point and density, but differed considerably in rotatory power, which equalled + 15·79°. The author suggests whether this variation between + 10·36° and + 15·79° in the rotatory power of substances, presenting otherwise identical characters, may not be indicative that conine, extracted from conium fruit, is a mixture in variable proportions of conine active and inactive upon polarized light.

Determination of Calcium Tartrate in Crude Tartar. A. S. Kestner. (*Comptes Rendus*, 1878, No. 16. From *Chem. News.*) For the determination of the potassium bitartrate a standard alkaline liquid is generally caused to act upon a hot solution of the sample in water. But it has been found that the results obtained by this process are too high. Certain tartars, and especially certain lees, contain acid substances of the nature of tannin, which act upon litmus paper and consume the alkaline liquid just as potassium bitartrate would do. To obtain exact results it is therefore necessary to ignite the sample, and determine the potassium in the residue by means of a standard acid. The determination of calcium tartrate is often

made by dissolving the sample of tartar in hydrochloric acid, and precipitating with caustic soda. This method gives satisfactory results if the specimen to be analysed is free from calcium sulphate. In the contrary case the numbers found are always erroneous, the error being proportionate to the quantity of gypsum present. It is known that calcium sulphate, in presence of an alkaline solution of a neutral tartrate, is converted into neutral calcium tartrate, whilst the alkaline base combines with the sulphuric acid. The reaction is so complete that in certain works it is used for the preparation of calcium tartrate intended for the manufacture of tartaric acid. At the moment when the hydrochloric solution of the tartar is neutralized, in order to precipitate the calcium tartrate, the most favourable conditions are obtained for the formation of this body at the expense of the calcium sulphate, and if there is gypsum in solution, as often happens, the quantity of calcium tartrate obtained by no means represents the amount actually present, but is augmented in equivalent proportions.

Some authors have recommended the following process:—Calcination of the tartrate to be analysed, when the tartrates and bitartrates are converted into carbonates. The potassic carbonate is dissolved in water, and shows on titration the quantity of bitartrate originally present. The calcium carbonate remaining on the filter shows, in like manner, the value of the pre-existing calcium tartrate. But this process, though accurate when the tartar is free from gypsum, is otherwise defective. Hence the following method is to be preferred:—

The sample is dissolved in hydrochloric acid, the filtered solution is neutralized with caustic soda, and then precipitated with calcium chloride. All the tartaric acid is precipitated as calcium tartrate. The precipitate is washed, calcined, and the calcium carbonate obtained is titrated in the ordinary manner. If the tartar has been previously titrated with a standard alkaline liquid, it is easy, from these two data, to calculate the respective quantities of potassium bitartrate and calcium tartrate; but this is only possible when the sample is free from other acid products.

Sulphocyanides in Urine. R. Gscheidlen. (*Pfluger's Archiv für Physiologie*, xiv., 401–412. From *Journ. Chem. Soc.*) The sulphates and phosphates having been removed from 100 c.c. of urine by baryta water, the filtrate evaporated to a syrup, extracted with alcohol, and the residue left on evaporating this extract dissolved in water, a solution is obtained which, after decolorization with charcoal, strikes a deep red colour with ferric chloride. The

colour is due to the presence of sulphocyanide. The absence of such other substances as could produce it having first been proved, the presence of a sulphocyanide was fully verified.

Experiments were made on the reactions of this substance, and, unless there be another body present, the results which have been obtained show that the various reactions observed by Schönbein, Sertoli, Lobisch, and Voit, are due to the presence of this sulphocyanide. This statement must be modified if, as sometimes stated, hyposulphurous acid is to be found in urine.

The results of fourteen experiments, made by means of Oehl's volumetric method, gave 0·0225 as the quantity of sulphocyanogen in 1000 parts of urine. This corresponds with 0·0314 of sodium sulphocyanate and 0·0376 of potassic sulphocyanide.

The question now arose whether it was due to the saliva or formed by some special organ. The saliva of a dog having been diverted from the mouth was collected separately, and the urine also collected during six days. The saliva contained sulphocyanides, the urine none. A similar experiment, in which the urine was collected for nine days, gave a like result.

The total quantity of sulphocyanides in the saliva, as estimated by Oehl, agrees with that found in the urine.

From these investigations it appears that sulphocyanogen is a normal constituent of the healthy urine of mammals.

Relation of Phosphoric Acid to Nitrogen in Urine. W. Zülzer. (*Journ. Chem. Soc.*, 1877, 205, from *Chem. Central.*) The author finds that the amount of phosphoric acid emitted in urine does not, as is generally supposed, bear a constant proportion to the nitrogen. From his own and others' researches, it appears that in the case of dogs and cats fed on pure flesh, the relation of nitrogen to phosphoric acid is, on the average, 100 : 10·4–12·8. With addition of fat to the diet, 100 : 9·2–11·9. When the animal is fed on flesh, after previous starvation, 100 : 6·6–9·6; with potatoes, the phosphoric acid is 22·5–29·7 per cent. of the nitrogen; with bread, 21·6–29·7 per cent.; with potatoes and fat, 30·8–37·3 per cent.; with calves' brains, 21·7 per. cent. After abstinence from food, the proportion of phosphoric acid decreases for one or two days, and then gradually rises for six to eleven days, again slightly decreases, as in the case of a diet of animal food. Shortly before death the amount again increases. With man, the usual proportion is, 17–20 per cent. In the forenoon the ratio is higher than in the afternoon or night. Children have a much greater proportion than older people. The greatest observed amount was 58·5 per cent., and the smallest, 8·7 per cent. In old

age the phosphoric acid increases slightly. After reference to the proportion in cases of disease, the author comes to the conclusion that the variation of proportion is related to the change of matter in the nerves; and that in general, the change of material of the flesh depends on the nervous activity.

Decomposition of Metallic Salts by Carbonic Acid. F. Mohr. (*Liebig's Annalen*, clxxxv., 286–295.) When carbonic acid gas is passed through solutions of the acetates of lead, zinc, or barium, a partial decomposition of the salt and precipitation of the metal as carbonate is effected. Many other salts, such as potassium chromate, borax, sodium phosphate, microcosmic salt, sodium acetate, sodium and potassium tartrates, etc., possess the power of absorbing carbonic acid gas; and in some instances, at least, this absorption is accompanied by or is due to decomposition.

Use of Gas Lime in the Manufacture of Ferro-cyanides. T. Douglas. (*Chem. News*, xxxvii., 126.) Gas lime generally contains large quantities of sulphocyanides. By mixing it with five per cent. of sodium carbonate, extracting the mixture with water, evaporating the solution to dryness, and heating the residue with iron filings in a copper crucible, sodium ferrocyanide is formed, which can be dissolved out by boiling water. The process has the additional advantage of freeing the gas lime from a portion of its sulphur.

Estimation of Nitrous and Nitric Acids. G. Lunge. (*Ber. der deutsch. chem.-Ges.*, x., 1073–1076. From *Journ. Chem. Soc.*)

1. *Estimation of Nitric Acid.*—The author finds that the estimation of nitric acid by oxidation of ferrous sulphate (Pelouze), and determining the excess of the latter by permanganate, gives accurate results. He recommends adding 20 per cent. of its weight of sulphuric acid to the solution before heating with the nitrate to facilitate the oxidation. Siewert's method, reduction in alkaline solution by zinc and iron, gives low and variable results. Hagar's modification and Schulze's process are also untrustworthy.

2. *Estimation of Nitrous Acid.*—The methods were tested on a solution of pure silver nitrate in sulphuric acid. Feldham's permanganate method gives good results, but the standard solution must not be too strong, and the nitrate solution should be added to it, not *vice versâ*, or there will be loss from the decomposition of the nitrous acid and escape of nitrogen dioxide. It is advisable to keep the solution at 40°–50°, as at a lower temperature the reaction does not take place instantaneously, so that the point of discolorization cannot be so accurately observed. Gerstenhofer's modification of

the bichromate method does not give equally good results, as it is difficult to observe the exact point when all the chromate is reduced. The other processes examined, namely, Siewert's, Hart's, and Crowder's, did not give accurate or constant results.

3. *Estimation of Nitrous and Nitric Acids.*—The nitrous acid in the mixture is first determined by oxidizing it to nitric acid by standard permanganate, and then the total quantity of nitric acid present in the solution is estimated by means of ferrous sulphate. The amount of nitric acid originally present is found by subtracting from the result that formed by the oxidation of the nitrous acid.

4. *Analysis of a "Nitrose."*—This nitrose (sulphuric acid used to absorb nitrous fumes) from a soda factory, had a density of 1·691 at 15°, and was saturated. It contained 4·13 grams N_2O_3 in 100 c.c., but no nitric acid. This result differs from those obtained by Winkler, who found nitric acid present. This however was probably due to the analytical method employed; for Winkler added the permanganate solution to the nitrose, and experiments made by the author with a solution of silver nitrate in sulphuric acid showed that in this case not only was nitric acid formed, but that nitrogen escapes as dioxide. It should be stated, however, that Kolbe found nitric acid in nitrose, although the nitrous acid determinations were made by adding the solution to the permanganate.

Various Methods for determining Nitric Acid. J. M. Eder. (*Zeitschr. anal. Chem.*, xvi., 267–314. From *Journ. Chem. Soc.*) The more generally used processes for the determination of nitric acid have been experimentally examined by the author. These processes he divides into two groups: 1. Those in which nitric acid is determined from a measurement of the amount of another substance which is oxydized by it. 2. Those in which the nitric acid is transformed into another nitrogen compound, which compound is capable of being easily measured or weighed. Each group of processes is subdivided.

Group I.—*A.* Methods which depend upon the Oxidation of Ferrous Salts. (a) *The nitrate is decomposed by excess of ferrous salt, and the amount of residual unoxidized salt is measured.*—Method of Pelouze, etc. The ferrous salt usually employed is the chloride. The process, as originally carried out, is open to several objections. The author has modified Fresenius's improvements as follows:—1·5 gram of very thin iron wire is dissolved in 30 to 40 c.c. of pure fuming hydrochloric acid, placed in a retort of about 200 c.c. capacity; the beak of the retort points upwards at a moderately acute

angle, and is connected with a U tube, which contains water. Solution of the iron is hastened by applying a small flame to the retort. Throughout the entire process a stream of carbon dioxide is passed through the apparatus. When the iron is all dissolved, the solution is allowed to cool, the stream of $C.O_2$ being maintained. The weighed quantity of nitrate contained in a small glass tube (equal to about 0·2 gram HNO_3) is then quickly passed into the retort through the neck; the heating is continued under the same conditions as before, until the liquid assumes the colour of ferric chloride; the whole is allowed to cool in a stream of $C.O_2$; water is added in quantity; and the unoxydized iron is determined by titration with permanganate. The results are exceedingly good. If the $C.O_2$ be generated in a flask, with a tube passing downwards for the reception of the acid, air always finds its way into the retort, and the results are unsatisfactory. The author recommends the use of Kipp's $C.O_2$ apparatus. By carrying out the operation exactly as is now described, the author has obtained very good results with ferrous sulphate in place of chloride. The same apparatus is employed; the tube through which $C.O_2$ enters the retort passes to the bottom of the liquid therein, and the lower extremity of this tube is drawn out to a fine point. The bubbles of $C.O_2$ are thus reduced in size, and the whole of the nitric oxide is removed from the liquid by the passage of these bubbles. The iron wire is dissolved in excess of dilute sulphuric acid, strength 1:3 or 1:4. When the liquid in the retort has become cold, a small tube containing the nitrate is quickly passed, by means of a piece of platinum wire attached to it, through the tubulus of the retort, and the cork is replaced before the tube has touched the liquid; $C.O_2$ is again passed through the apparatus for some time, after which, by slightly loosening the cork, the tube containing the nitrate is allowed to fall into the liquid. The whole is allowed to remain at the ordinary temperature for about an hour—this is essential,—after which time the contents of the retort are heated to boiling, $C.O_2$ being passed continuously into the retort, and the boiling continued till the liquid assumes the light yellow colour of ferric sulphate. After cooling, water is added (this may be omitted), and the unoxydized iron is determined by means of a permanganate. The author also describes a slight modification of this process, allowing the use of a flask in place of the retort, and of ammonio-ferrous sulphate in place of iron wire. Although the titration with permanganate is more trustworthy when sulphuric acid is employed than when hydrochloric acid is used, the author nevertheless thinks that the

use of ferrous chloride is generally to be recommended in preference to that of ferrous sulphate. When the chloride is employed, no special concentration of acid is necessary ; the nitric oxide is more readily expelled from the liquid, and the process is finished in a shorter time.

The final point in the titration with permanganate, when the sulphate is employed, is rendered more easy of determination by adding a little potassium sulphate to the liquid.

(b)—*The nitrate is decomposed by excess of ferrous salt, and the amount of ferric salt is directly determined.*—The process of Fresenius (*Zeitschr. anal. Chem.*, i., 26) is slightly modified by the author. About 10 grams of ammonio-ferrous sulphate is dissolved in a flask, in about 50 c.c. of hydrochloric acid (sp. gr. 1·07) in a stream of $C.O_2$. The tube through which the $C.O_2$ enters is drawn to a point ; an exit tube, somewhat trumpet shaped, to admit of any liquid that may spurt finding its way back into the flask, passes downwards into water. After solution of the double salt, the nitrate is dropped in, with the precautions already detailed, and the liquid is boiled until the nitric oxide is all expelled. The hot liquid is diluted with twice its own volume of water, excess of standard stannous chloride solution is run in, the whole is allowed to cool in a stream of $C.O_2$, and the excess of tin is determined by means of a standardised iodine solution. This process is strongly recommended by the author.

(c)—*The nitric acid is determined by titration with standard ferric solution.*—This is the process of Grossart : it has been modified by Mohr. The author has carefully examined all proposed forms of the process, but has failed to obtain satisfactory results from any. The principal objections are :—

1. The final reaction is indefinite.
2. Nitric acid is lost by evaporation from the hot solution.
3. The reaction between nitric acid and ferrous sulphate is incomplete, unless the latter be in excess.

B. Method depending upon the Oxidation of Chromium to Chromic Acid.—This method gives most excellent results, provided atmospheric air is completely excluded from the apparatus, and no substances are present which are capable of forming insoluble chromates. Chlorides and sulphates exert no injurious effect upon the reaction. In the analysis of such a substance as lead nitrate by this process, the author recommends solution of the salt in water, precipitation of the lead by addition of sodium carbonate, filtration, and evaporation of the filtrate to dryness. He places the mixture

of nitrate, chromium oxide, and soda in a boat—of platinum if possible—which is then placed in a combustion tube, fitted with an exit tube passing a little way under the surface of water. Dry $C.O_2$ is passed through the combustion tube; the mixture is heated for ten minutes; the boat is withdrawn; the mass is dissolved in water; and the chromic acid is determined. The nitric oxide which escapes during the reaction may be determined, and in this way two analyses may be simultaneously performed.

Wagner's modification of the process, in which the mixture is fused in a crucible, has been tested by the author, but the results are so unsatisfactory that he cannot recommend the method, even for technical analyses.

Group II.—*A.* Methods which depend upon the transformation of the Nitric Acid into Nitric Oxide. (a) *The nitric oxide produced is retransformed into nitric acid, which is then measured. The nitric acid is decomposed by means of ferrous chloride.*—The process was originally brought forward by Schlösing (*Journ. pr. Chem.*, lxii., 142); Reichardt (*Zeitschr. anal. Chem.*, ix., 23) modified the apparatus. The author employed the apparatus of the latter chemist; the nitric acid was determined by titration with one-tenth the normal soda solution. Some difficulty is often experienced in removing the whole of the nitric oxide from the solution of ferrous chloride. The author closes the stopcock, which is fitted to the flask containing the ferrous chloride, etc., and removes the lamp; a slight vacuum is then produced within the flask, and the nitric oxide makes its escape from the liquid into the area of diminished pressure. After a little time the lamp is replaced, and the stopcock is again opened. This process is especially intended for the estimation of nitric acid mixed with organic matter. The author's results prove that the process is very satisfactory in every respect; for its special purpose, he regards this method as the best that has yet been proposed.

Reichardt (*Zeitschr. anal. Chem.*, ix., 24) has proposed to collect the nitric oxide in a vessel containing soda, and thus to do away with the use of mercury. If the hydrogen which is used in the process be very pure, and if the soda solution be freed from air, the results are good, although not quite so rigorously exact as those obtained by the use of the original method.

Wagner (*Dingl. polyt. Journ.*, 201, 423) decomposes the nitrate by fusion with soda and chromium oxide, receives the nitric oxide in a vessel containing soda solution and oxygen, and determines the residual alkali. The author's results show that the method is satisfactory, provided no organic matter be present. The process is

not, however, as good, or so readily carried out, as that of Schlösing.

(b) *The nitric oxide produced is directly measured.*—The nitric oxide is produced as in Schlösing's process. The author adopted Tiemann's modification of the process (*Deutsch. chem.-Ges. Ber.*, vi., 1034), in which, as recommended by Reichardt, the use of mercury is replaced by that of caustic soda. The results are very satisfactory. The method is well adapted to the determination of nitric acid in well waters. If the substance under examination be a complicated mixture, such as tobacco, or other organic bodies, the author gives the preference to the method of Schlosing described under (a).

B. Methods depending on the Transformation of the Nitric Acid into Ammonia.—The processes of Schulze, Harcourt, etc., etc., have been examined. The author regards this method of determining nitric acid as one of the best, provided that certain conditions be rigorously complied with. His process, in which he claims to have eliminated all sorts of error, is as follows:—The apparatus consists of a moderate-sized retort, the beak of which is turned upwards, and is brought into communication with a small flask, which is closed by a caoutchouc cork. An exit tube from the flask is bent twice at right angles, and communicates with a Peligot's bulb apparatus; containing a measured quantity of normal sulphuric acid. A somewhat elongated bulb is blown upon the exit tube from the flask, near the latter. The bulbs containing the acid are connected with an aspirator. A funnel tube, fitted with a stopcock and drawn out to a narrow opening, and curved at its lower extremity, passes through the tubulus to the bottom of the retort. The retort and the flask both rest upon wire gauze. The weighed quantity of nitrate is brought into the retort, finely granulated zinc and iron filings, in the proportion of 2 : 1 as recommended by Harcourt, are added, and mixed with the nitrate by shaking; about 50 c.c. of caustic potash solution, of sp. gr. 1·15 to 1·25, are then allowed to flow into the retort through the funnel tube, and the whole is allowed to remain undisturbed, at the ordinary temperature, for an hour. After the expiration of that time, distillation is commenced by gradually heating the contents of the retort to boiling, and is continued until from 5 to 10 c.c. of liquid has passed over into the small flask. A tolerably rapid stream of air—freed from ammonia and ammonium salts— is now sucked through the apparatus, without discontinuing the distillation; the small flask is heated, and the operation is continued until but little liquid remains in the

flask. The residual acid is determined by titration with one-tenth normal soda solution.

Several experiments showed that the gravity of the potash solution may vary within the limits given above. If the liquid be heated immediately the akaline solution is poured upon the nitrate the results are unsatisfactory. The more concentrated the potash solution the greater is the error introduced by omitting the preliminary digestion at the ordinary temperature. The same zinc and iron should not be used more than once. The combination of zinc and iron is quite as good as aluminium, and is much more readily procured. The use of platinized zinc does not give good results.

Alcoholic potash solution has been recommended in order to prevent bumping. By making use of a current of air bumping is avoided, and alcohol need not be used; the current of air also insures the complete carrying over of the ammonia into the titrated acid.

Action of Hydrochloric Acid upon Metallic Sulphates. A. B. Prescott. (*Chem. News*, xxxvi., 179.) The following table shows the results obtained by heating one gram of each sulphate with 4·035 grams of aqueous hydrochloric acid containing 31 per cent. of H Cl, and evaporating the product to dryness on the water bath.

	Chloride formed. Grams.	Sulphate undecomposed. Grams.	Percentage of Metal changed to Chloride. Grams.
Ag_2SO_4	0·920	none	100
$HgSO_4$	0·915	,,	100
$Bi_2 3SO_4$	0·027	0·836	16·4
$Na_2SO_4 10H_2O$ . .	0·070	0·807	19·3
$Al_2 3SO_4 18H_2O$.	0·042	0·895	10·5
$(NH_4)_2SO_4$ . . .	0·083	3·898	10·2
$CoSO_4$	0·072	0·914	8·6
$CuSO_4 5H_2O$ . . .	0·019	0·964	3·6
$FeSO_4 7H_2O$ . . .	0·013 (ferric chloride)	0·977	2·3
$CaSO_4$	0·017	0·981	1·9
$ZnSO_4 7H_2O$ . . .	0·007	0·990	1·0
$PbSO_4$	0·007	0·992	0·8
$MnSO_4 4H_2O$ . . .	0·004	0·992	0·8
K_2SO_4	0·006	0·993	0·7
$MgSO_4 7H_2O$ . . .	0·003	0·995	0·5
$Sb_2 3SO_4$	none	1·000	—
$CaSO_4$	,,	1·000	—
$SrSO_4$	,,	1·000	—
$BaSO_4$	,,	1·000	—

Purification of Valerianic Acid. M. Lescœur. (*Chem. Centralbl.* From *New Remedies*, 1878, 13.) Valerianic acid prepared from fusel oil is frequently contaminated with homologous acids, as well as with amyl valerianate. To remove these, the author recommends to dissolve in two equivalents of the crude acid, one equivalent of neutral sodium valerianate, by gentle heat. On standing in a cool place the solution deposits crystals of sodium trivalerianate, which are dried upon porous plates, and finally by pressing between blotting-paper. These yield, on distillation with sulphuric acid, a perfectly pure valerianic acid, provided that everything which distils over below 260° and above 280° F., is rejected.

Elemic Acid.—Contribution to the Chemistry of Elemi. Dr. E. Buri. (*Pharm. Journ.*, 3rd series, viii., 601.) In addition to bryoidin and amyrin, the author has separated a third crystalline principle from elemi. It is contained in the alcoholic mother-liquor obtained after the crystallization of amyrin. The amorphous resin left upon evaporation of this liquor is dissolved in petroleum spirit (60° C. boiling point), the solution becomes turbid with more petroleum spirit. The mixture is shaken with potash solution, and after separation the jelly is emulsified by the addition of some water, and then dissolved in ether. Instead of petroleum spirit, ether may be used for dissolving the resin. On supersaturating the alkaline solution with H Cl, elemic acid is precipitated, and freed from an amorphous acid resin by repeated crystallization from alcohol. Its composition is $C_{35} H_{56} O_4 = (C_5 H_8)_7 O_4$. The potassium salt, $K C_{35} H_{55} O_4 . 18 H_2 O$, crystallizes from its strong alkaline solution in needles. The formula $(C_5 H_8)_7 O_4$ shows elemic acid to be allied both with bryoidin and amyrin, as well as with other derivatives of the terpene $C_5 H_8$.

Assay of Opium. M. Prollius. (*Pharmaceut. Centralhalle*, 1878, 20, from *Schweiz. Wochenschr. für Pharm.*) The process recommended is a very simple one, and is stated to give very exact results. The opium is exhausted with 9 to 10 times its weight of spirit of 34 per cent. strength. Of the resulting tincture, 100 parts are well shaken with 5 parts of ether and 2 parts of solution of ammonia in a stoppered bottle, and then allowed to stand from twelve to twenty-four hours. The liquids separate slowly, and retain—partly in the ether, partly in the alcoholic liquid—the colouring matter, narcotine, and other crystallizable constituents of opium; while the morphia separates in crystals between the two layers, and finally sinks to the bottom. The fluid portion is decanted, the crystals are washed with diluted alcohol, dried, and weighed.

Neurine. (*Pharm. Centralhalle*, 1877, 370; *New Remedies*, 1878, 12.) This alkaloid, existing in the yolk of egg and in bile, has lately been used with good success in diphtheria, and deserves to be further studied. Neurine has been variously identified heretofore with choline, sinkaline, trimethyl-oxyethyl-ammonium-hydroxide, hydroxethylen-trimethyl-ammonium-hydrate. It has, however, been recognised as trimethyl-vinylammonium-hydroxide: $3\,C\,H_3.\,N\,C_2\,H_3.\,H\,O$ or $C_5\,H_{13}\,N\,O$); and it is regarded as identical with amantine, a non-poisonous alkaloid, occurring in certain poisonous mushrooms. Its mode of preparation is the following:—

From Eggs.—Yolk of egg is extracted by shaking with ether, the residue is once more extracted with warm alcohol, the ethereal and alcoholic solutions are mixed together and distilled, and the residue in the flask boiled for one hour with excess of solution of baryta. The latter having been precipitated by passing carbonic acid through the mixture, the whole is filtered, the filtrate evaporated at about 80° C. to the consistence of syrup, and extracted with absolute alcohol. The alcoholic solution is then precipitated by platinum chloride, whereby a double chloride of neurine and platinum, insoluble in strong alcohol, is produced. This is collected, dissolved in water, the platinum precipitated by sulphydric acid, and the filtrate evaporated to a syrup, or dried over sulphuric acid in vacuo, or else dissolved in absolute alcohol and covered by a layer of ether. In either case the product is crystallized neurine hydrochlorate. This is then dissolved in water and macerated with freshly-precipitated silver oxide, to remove the chlorine. The filtrate, evaporated on the water bath, or better, dried over sulphuric acid, yields pure neurine.

From Bile.—Bile is boiled with baryta solution in excess, the solution filtered, the filtrate again boiled for twelve hours with baryta water, then mixed with dilute sulphuric acid, as long as any precipitate is produced, concentrated on the water bath, and mixed gradually with sulphuric acid, as long as vapours of hydrochloric acid escape. The mass is then extracted with alcohol, the alcoholic solution evaporated, the residue boiled with moist oxide of lead, the filtrate deprived of lead by sulphydric acid, evaporated, and the residue dissolved in absolute alcohol, and, when necessary, filtered.

It is then precipitated with platinum chloride, and further treated as above stated.

Properties.—Neurine is a colourless, syrupy, hygroscopic, alkaline liquid, which absorbs carbonic acid from the air, and is converted into a carbonate. It is soluble in all proportions in water and

alcohol. On boiling its aqueous solution it is decomposed into trimethylamia and glycol. With acids it forms partly crystallizable, partly deliquescent salts. The hydrochlorate is best prepared by mixing the double chloride of neurine and platinum with potassium chloride and exhausting the dry mass with absolute alcohol. On heating anhydrous neurine hydrochlorate with very concentrated nitric acid in a glycerin bath, it is converted into the poisonous alkaloid muscarine (naturally occurring in poisonous mushrooms), and vapours of nitrous acid escape.

Tests of Purity.—Neurine, as obtained generally from yolk of eggs, should form a clear solution in water and alcohol, and the solution should be strongly alkaline. On mixing one gram of it with 0·6 gram of powdered oxalic acid, only a trace of carbonic acid should be given off, and after heating in the water bath and cooling, a solid saline mass should remain. Viscosity would point to some adulteration, most likely glycerin. On heating it in a small retort trimethylamia distils over.

Further reports on its use in diphtheria are shortly to be expected.

A New Test for Morphine. G. Pellagri. (*Pharmaceut. Centralhalle*, 1877, 397, from *Ber. der deutsch. chem.-Ges.*) The suspected substance is completely freed from moisture by the heat of a water bath, and then dissolved in concentrated hydrochloric acid. The solution is mixed with a small quantity of pure sulphuric acid and evaporated on an oil bath at a temperature of from 100° to 120° C. A purple coloration is observed, even in the presence of substances which are readily carbonized. After the evaporation of the hydrochloric acid, a fresh portion of it is added, and then some sodium bicarbonate, when a violet coloration is produced, which is unalterable in contact with the air, and yields nothing to ether On the addition of a few drops of a concentrated solution of iodine in hydriodic acid, the violet colour passes into green, and the compound is soluble in ether with a purple colour. This reaction is due to the formation of apomorphia. Codeine gives the same reaction, but can be separated from the morphia by ether. Brucine treated in the same manner gives, on neutralization with the sodium salt, a blue coloration, passing into red on the addition of iodine; but this reaction is not very delicate.

Salicylate of Zinc. F. Vigier. (*Journ. Pharm. de Chim.* [4], xvii., 41; *Pharm. Journ.*, 3rd series, viii., 692.) The author prepares this salt, for use in hypodermic injection, by dissolving salicylic acid with heat in distilled water, and as the solution progresses adding successive small quantities of oxide of zinc suspended in a

little water. Combination commences at once, and the addition of zinc is stopped when, after boiling the liquor, there is a slight deposit of the oxide. The liquid is then filtered, and upon cooling the salicylate of zinc crystallizes out in long needles. The mother-liquor is decanted off and the crystals are dried in the open air, or in a stove between folds of filter paper. The product thus obtained is extremely white. The mother-liquor, upon evaporation, yields a further quantity of salicylate of zinc. During the operation, a porcelain capsule should be used, and all metallic contact avoided, especially with iron, which would colour the liquid violet. If the solution should be slightly coloured, it may be decolourized by boiling it with a little animal charcoal.

When concentrating the solution, it is necessary to stop the boiling as soon as the water is insufficient to dissolve the salt: as under the prolonged action of heat the normal neutral salicylate of zinc is split up into salicylic acid, which remains dissolved, and a basic salicylate of zinc, which is deposited as a very light white powder.

The neutral crystalline salicylate of zinc contains three molecules of water of crystallization. None of this is lost upon exposure over sulphuric acid, but two molecules are given off after heating at 100° C., and the other at 150° C. The salt is very soluble in boiling water, from which it crystallizes on cooling in long, very brilliant silky white needles, having a satin-like lustre. At first its taste is sweet, then styptic and bitter. 100 parts of water at 20° dissolve 5 parts of the salicylate. It is very soluble in alcohol, ether, and methylic alcohol; and upon evaporation of these solutions it is deposited in short silky needles, usually grouped round a common centre. Carbon bisulphide does not dissolve it in the cold, but when boiling it takes up a small proportion, which again crystallizes upon the evaporation of the liquid. In oil of turpentine it is insoluble. Sulphuric acid dissolves it without coloration, if the salt is pure. Nitric acid attacks it with difficulty in the cold when heated it dissolves it, with evolution of nitrous vapours. Hydrochloric acid also acts upon it with difficulty in the cold, but dissolves it when heated, and upon cooling the solution forms a crystalline mass. Like salicylic acid, an aqueous solution of salicylate of zinc is coloured violet by ferric chloride. Ammonia produces on the aqueous solution a precipitate, soluble in an excess of the precipitant. Hydrosulphate of ammonia gives a white precipitate of sulphide of zinc.

The basic salicylate of zinc contains no water of crystallization, and is nearly insoluble in water, alcohol, and ether. Upon heating

it with salicylic acid and a sufficient quantity of water, the neutral salicylate is re-formed.

Salicylate of zinc is reported to have been employed by Dr. Poignet and Desmarres successfully, as an astringent antiseptic in blennorrhagia, cancerous sores on the tongue, purulent ophthalmia, etc. The proportion used for blennorrhagia is 0·5 to 1 gram in 100 grains of distilled water; and for cancerous sores, a four per cent. solution.

Citro-thymolate of Quinine. C. Pavesi. (*Journal de Pharmacie*, [4], xxvi., 24.) The author has obtained a compound of quinine, thymol, and citric acid, in the form of white crystals, which have a very bitter taste, are moderately soluble in cold water, more freely so in boiling water, and very soluble in alcohol. Their exact composition has not yet been determined. They may be prepared as follows:—

Four parts of quinine are gently heated in a flask with six parts of oil of thyme and a sufficient quantity of alcohol to effect complete solution. The mixture is allowed to stand for twelve hours, after which two parts of powdered citric acid are added, the whole again heated, filtered, and evaporated to the consistence of a syrup. The yellow substance which thus separates upon cooling is dissolved in boiling water, the solution filtered through animal charcoal, and the filtrate concentrated by evaporation at a very moderate temperature, when the salt will be found to separate slowly in well-defined crystals.

The Preparation of Hydrobromic Acid. E. R. Squibb. (*Transactions of the Medical Society of New York*, 1878.) The author has tried all the published processes for the preparation of this acid for medicinal use, and finds the following to be the best.

The formula and process for making an acid of this strength are as follows:—

℞	Potassium Bromide	6 parts
	Sulphuric Acid, sp. gr. at 15·6° C. = 60° F. 1·838, at 25° C. = 77° F. 1·828 . .	7 parts
	Water	9 parts

Add to the sulphuric acid one part of the water, and cool the mixture. Then dissolve the potassium bromide in six parts of the water by means of heat, supplying the loss of water by evaporation during the heating. Pour the diluted sulphuric acid slowly into the hot solution with constant stirring, and set the mixture aside for twenty-four hours, that the sulphate of potassium may crystallize.

Pour off the liquid into a retort, break up the crystalline mass, transfer it to a funnel, and having drained the crystals, drop slowly upon them two parts of the water, so as to displace and wash out the acid liquid. Add the liquid thus drained off and washed out to that in the retort, and distil the whole nearly to dryness, or until nothing further distils off by moderate heating. The distillate will weigh about ten parts, and should contain about 37 per cent. of hydrobromic acid. Assay this by means of normal volumetric solution of sodium, and add distilled water until it shall have the strength of 34 per cent. of hydrobromic acid. The product will weigh about eleven parts, and the loss of hydrobromic acid, as calculated from the potassium bromide, will be about 1·2 per cent.

Solution of hydrobromic acid thus prepared is a limpid, colourless, odourless liquid, having a strong acid taste. At 15·6° C. = 60° F. it has a sp. gr. of 1·274. At 25° C. = 77° F. the sp. gr. is 1·257, both compared with water at 15·6° C. = 60° F. It is free from sulphuric acid, or gives but an unimportant trace when tested with solution of baric chloride; and is free from sulphurous acid when tested by its action on pure zinc, yielding a gas which does not blacken paper moistened with solution of plumbic acetate. It leaves on evaporation no residue, or but an accidental trace. It consists of 34 per cent. of hydrobromic acid, and 66 per cent. of water.

The Preparation of Hydrobromic Acid. Dr. H. Hager. (*Handbuch der pharmaceut. Praxis*, i., 628.) The process suggested by the author appears to be more simple than any of those which have been recently recommended for the same purpose. 100 parts of crystallized sodium hydrosulphite are placed in a flask together with 50 parts of bromine and 10 parts of water, and the gas thus generated is conducted into the upper portion of 140 parts of water contained in another vessel. Whenever the current of gas becomes slower, a gentle heat is applied to the flask. The product amounts to 185 to 190 parts of liquid acid, containing 25 per cent. of anhydrous hydrobromic acid, and has a specific gravity of 1204. It should be kept in a cool place and protected from the light.

Hydrobromic Ether. J. P. Remington. (Abstract from the *Proceedings Amer. Pharm. Association*, 1877.) Attention has been drawn to this substance on account of its asserted superiority as an anæsthetic to the agents usually employed; and reasoning from its chemical compositon and the therapeutical effects of its component parts, it is surprising that it has not been brought to notice before, and used extensively. Under the head of a "New Anæsthetic Agent" (*Amer. Journ. Pharm.*, March, 1877), a notice as follows

appears of it. "Rabutean, in a memoir read before the Académie des Sciences, states that he has investigated the physiological properties and mode of elimination of hydrobromic ether. He has satisfied himself that this anæsthetic agent, which possesses properties intermediate to those of chloroform, bromoform, and ether, might be advantageously employed to produce surgical anæsthesia. The hydrobromic ether is neither a caustic nor an irritant. It can be ingested without difficulty, and applied without danger, not only to the skin, but to the external auditory meatus and to the mucous membrane. It is eliminated completely, or almost completely, by the respiratory passages, in whatever way it may have been introduced into the system.

The author revises and criticises the various methods for the preparation of hydrobromic ether recommended by Löwig, De Vrij, Personne, and Hoffmann, and finally suggests the following process as less objectionable and as yielding a purer preparation than any of the others he has tried:—

Thirty-three troy ounces of absolute alcohol are introduced into a retort or flask, and the whole placed in an ice or cold water bath, and allowed to become thoroughly cooled. Six troy ounces of amorphous phosphorus are then added to the cooled alcohol, and the whole shaken. A glass-stoppered bottle of the proper size to hold twenty-six troy ounces of bromine is now selected; this quantity is then weighed into it, and having inserted a small fragment of broken glass betwen the stopper and the lip of the bottle, the stopper is secured in this position, so that the bromine may be readily dropped on inverting it without the escape of any more fumes than is necessary.

The bromine is now to be slowly dropped into the mixture, care being taken to avoid too great elevation of temperature. When all the bromine is added, the whole mixture is allowed to stand twenty-four hours, when the flask is connected with a good distillatory apparatus and placed in a water bath, and the distillation is continued as long as any liquid comes over. The distillate is then washed with water, and if acid to litmus paper a small quantity of potash or soda solution is added to the water; after separating the hydrobromic ether from the water, it is redistilled after adding some fragments of chloride of calcium to the flask, to free from remaining traces of water.

Hydrobromic ether is a transparent, colourless liquid, having an agreeable ethereal odour; heavier than water; specific gravity, 1·40 (Löwig); vapour density, 3·754 (R. Marchand); very volatile;

boiling point, 40·7° C., when the barometer stands at 757 mm. (Pierre). Löwig considers its taste as strongly and disagreeably sweetish, with a somewhat burning after-taste. The vapour when inhaled exerts an anæsthetic effect like chloroform. It is sparingly soluble in water, but mixes in all proportions with alcohol and ether.

It burns with difficulty, but with a beautiful green flame, which does not smoke, a strong odour of hydrobromic acid being at the same time evolved (Löwig). It is not decomposed by nitric acid, sulphuric acid, or potassium. With ammonia it yields hydrobromate of ethylamin.

Creasote from Beechwood Tar. F. Tiemann and B. Mendelsohn. (*Ber. der deutsch. chem.-Ges.*, x., 55; *Journ. Chem. Soc.*, 1877, 888.) The authors have examined the two chief constituents, creosol and phlorol, of this creasote, *i.e.*, of the fraction boiling at about 220°, with the view to establish their structural relations.

Creosol was converted into monacetyl-creosol, and the latter oxidized by agitation with a solution of potassium permanganate in presence of acetic acid. After saponifying the aceto-acid thus obtained, the solution yielded vanillic acid. Creosol appears, therefore, to be parahydroxyl-metamethoxyl-toluene.

The authors also describe a new ethyl ether of vanillic acid, the compound $C_6.H_3.OH.OCH_3COO.C_2H_5$. It is a colourless, mobile liquid, boiling at 291°–293°, and solidifying at -10° to a crystalline mass.

Phlorol was converted into methyl-phloral, and the latter oxidized by boiling with a solution of potassium permanganate. The product, which also contained dimethyl-protocatechuic acid, yielded, after fusion with potassium hydrate, oxyphthalic acid. Phloral must hence be regarded as an oxyxylene, $C_6H_3(OH).(CH_3)_2$.

A phlorol was also obtained by dry distillation from the calcium salt of phloretic acid. The known relation of this latter to onisic acid compels the inference that the phloral in question is an ethylphenal, and therefore isomeric with the compound previously considered.

The Purity of Wood Tar Creasote. MM. Bouchard and Gimbert. (From *Gazette Hebdomadaire.*) None but pure wood tar creasote ought to be used for internal administration; and a preparation intended for that purpose ought to stand the following tests:—It should boil at 219° C., form crystallizable salts with potash but not with soda, produce no precipitate with collodion, and impart a green, and then brown colour to an aqueous solution of perchloride of iron.

The authors recommend the neutral creasotate of potassium as the best form for therapeutical purposes. To make this salt the beechwood creasote is dissolved in half its volume of ether, and mixed with a concentrated alcoholic solution of caustic potash.

Relative Sensitiveness of Phenol and Salicylic Acid Reactions. A. Almén. (*Archiv der Pharm.* [3], x., 44–57; *Journ. Chem. Soc.*, 1877, 360.)

1. *Phenol reaction with Ferric Chloride.*—A dilute solution of phenol gives a fine violet colour when treated with ferric chloride. This colour is lasting if the acid is pure. One part of crystallized salt was dissolved in 19 parts of water. One or two drops—or still less when this solution was further diluted—were added to a solution of phenol, 20 c.c. of which were put into a test tube. A large excess of ferric chloride, or the addition of hydrochloric acid or ammonia, hinders the reaction, and is liable to destroy the colour. With regard to the sensitiveness of the reaction, it may be mentioned that an indication of a violet colour is obtained with a solution containing 1 part of phenol in 3,000 parts of water.

2. *Phenol reaction with Ammonia and Sodium Hypochlorite.*—By warming an ammoniacal solution of phenol with sodium hypochlorite, a deep blue colour is obtained which is lasting, but turns red on the addition of acids. Alkalies restore its blue colour. The colour is destroyed if chlorine is liberated by the addition of acids, more especially if the solution is hot. If much phenol is present—for instance, as much as 1 in 1000—the quantity of ammonia and hypochlorite of sodium may vary considerably without injuring the reaction. With very dilute solutions, however, a deficiency of ammonia is more injurious than excess, whilst excess of sodium hypochlorite destroys the reaction. With very weak solutions, it is best to use about ten drops of 10 per cent. NH_3 solution.

With regard to the sensitiveness, Salkowski mentions that a distinct blue coloration is obtained with a solution containing $\frac{1}{4000}$, using chloride of lime and ammonia. According to the author's method, the presence of phenol in a solution containing $\frac{1}{5000}$ could be detected very easily when 20 c.c. of the solution are used. With solutions containing $\frac{1}{10000}$ to $\frac{1}{15000}$, blue colours were produced after a short time; whilst with $\frac{1}{20000}$ to $\frac{1}{30000}$, a change could be perceived only after boiling the mixture for fifteen minutes. A solution of $\frac{1}{40000}$ to $\frac{1}{50000}$ phenol gave a reaction after twenty-four hours. No reaction could be obtained with $\frac{1}{60000}$. A moderately concentrated solution of sodium hydrochlorite was used in these ex-

periments, which was prepared from chloride of lime, by triturating the latter with water, filtering, precipitating with sodium carbonate, and again filtering. Three to five drops of this solution were used in every experiment.

3. *Phenol reaction with Aniline and Sodium Hypochlorate.*—Jacquemin mentions (*Revue méd. de l'Est*, 1874, 10, 359) a reaction for phenol depending on its conversion into sodium erythrophenate. By treating phenol with an equal weight of aniline and adding sodium hypochlorite, a pure dark blue and constant colour is obtained, which acids redden and alkalies turn blue. The reaction is said to be very sensitive and unalterable by various organic substances, such as alcohol, fat, etc. But it is also stated that aniline alone, without the addition of phenol, produces a blue colour with sodium hypochlorite, and that with dilute solutions the latter gives violet liquids, which after a short time assume a dirty yellow colour, and finally become colourless. In mixture it is, therefore, difficult to distinguish the aniline colour from the phenol colour, especially if moderately concentrated solutions of phenol are worked with. But by using a small quantity of sodium hypochlorite, both phenol and aniline assume the same colour in weak solutions. The bluish violet colour produced may last from one-half to two hours, and may then disappear, leaving the dirty yellow colour for twenty-four hours longer. An excess of sodium hypochlorite interferes with the reactions. 30–40 c.c. of phenol solution were used, and indications obtained with dilutions containing $\frac{1}{50000}$ to $\frac{1}{60000}$ after the lapse of from five to twenty-four hours.

4. *Phenol reaction with Bromine Water.*—Landolt has shown that an excess of bromine water gives a crystalline precipitate of *tribromophenol* in concentrated or dilute solutions of phenol, and Fresenius mentions that slight precipitates of this substance are soluble in alkalies without being reprecipitated by hydrochloric acid. A distinct turbidity is said to be formed with solutions containing $\frac{1}{14000}$ to $\frac{1}{55000}$ phenol. After a few hours a crystalline precipitation is produced with a $\frac{1}{57000}$ phenol solution. In repeating these experiments, the author treated 20 c.c. of the dilute phenol solution with concentrated bromine water, until the mixture assumed a reddish yellow constant colour of bromine. To this mixture 5,000, 10,000, and 20,000 parts of distilled water were added, when a milky turbidity was produced, which in a few minutes deposited a white-yellow, crystalline, shining precipitate. A slight precipitate was obtained after twenty-four hours, when a solution containing $\frac{1}{60000}$ phenol was treated under similar conditions. Under the microscope this

precipitate could be identified as forming fine stellated needles of *tribromophenol*. The reaction is not only very sensitive and simple in application, but it has also the advantage that the consistency and the quantity of the precipitate may, with some practice, serve as an approximate indication of the phenol contents.

5. *Phenol reaction with Mercurous Nitrate and Traces of Nitric Acid.*—Plugge mentions (*Zeitschr. für analyt. Chem.*, xi., 173) that carbolic acid gives a deep red colour with mercurous nitrate and a minute quantity of nitrous acid. The author obtained, with solutions containing $\frac{1}{3000}$, a red colour; with $\frac{1}{10000}$ a yellowish red colour; while with $\frac{1}{150000}$ and $\frac{1}{200000}$ solutions uncertain reactions were obtained. Although, according to Plugge's account, a distinct colour is obtained with solutions containing $\frac{1}{600000}$ phenol, while solutions containing $\frac{1}{2000000}$ phenol give a coloration which is perceptible, the author could not obtain a more delicate reaction than that by which a solution contained $\frac{1}{15000}$ of phenol, in spite of his having prepared the nitrate in the pure state and free from any oxide.

6. *Phenol reaction with Mercuric Nitrate and Traces of Nitrous Acid.*—This reaction proved to be an exceedingly delicate one. It was used, like Meyer Hoffmann's reaction for tyrosine, viz., boiling the phenol solution with a neutral solution of mercuric nitrate (as used for titrating urine), and adding a very dilute solution of fuming nitric acid or nitrate of potassium, drop by drop. 20 c.c. of phenol solution was used, and gave with $\frac{1}{30000}$ phenol a slight precipitate with a fine red colour. Solutions of 1 part phenol and 5,000, 20,000, and 30,000 parts of water, gave fine red liquids. With $\frac{1}{40000}$ to $\frac{1}{60000}$ solutions, at first faint colours were formed, which, in five minutes, assumed fine light red colours. 1 part of phenol, with 150,000 and 200,000 parts of water, gave a reaction with nitrate of potassium, but not with nitrogen tetroxide.

7. *Phenol reaction with Millon's Reagent.*—This reaction, which was found out accidentally by the author, forms the most sensitive of all phenol reactions. Millon's reagent is prepared by dissolving mercury in ordinary fuming nitric acid, boiling and diluting the solution with 2 volumes of water. 20 c.c. of phenol solution is boiled with 5 to 10 drops of Millon's reagent, and to the hot solution nitric acid is added, drop by drop, until the precipitate formed is re-dissolved. The mixture now assumes a fine red colour, which remains constant for several days. A large excess of nitric acid should be avoided if good results are to be obtained. The sensitiveness of the reaction is so great that a solution containing $\frac{1}{2000000}$ of phenol still gives a faint colour, so that about $\frac{1}{100}$ of a milligram or $\frac{1}{6000}$ of a grain

of phenol could be detected. It is well known that other substances give similar reactions with Millon's reagent. But this circumstance, connected with the question as to the best means of applying the reagent for phenol alone, cannot be dealt with in the subject of the present investigation.

Salicylic Acid reactions.—1 gram of the best salicylic acid o commerce—so-called sublimed salicylic acid, consisting of pure white and small fine shining crystalline needles, with but little smell —was dissolved in hot water, and the solution made up to 1 litre. By further dilution with distilled water, solutions of given strength were prepared, and 20 c.c. used in each trial. The phenol reactions which were the most sensitive, viz., 1, 2, 4, and 7, gave the following results when applied in the same manner to salicylic acid :—

Reaction (2) always gave unsatisfactory results; blue or green colours could not be obtained at a concentration of 1 part of salicylic acid to 1000 parts of water.

Reaction (4) answers as well as with phenol; the crystals formed had the same characteristic properties when investigated microscopically. The only perceptible difference was that the reaction was not quite so sensitive, $\frac{1}{40000}$ and $\frac{1}{50000}$ giving neither precipitates nor microscopic crystals.

Reaction (7) gave the same red colour at a dilution of 1 part of salicylic acid with 1,000,000 parts of water.

Reaction (1) gave much better results, the sensitiveness being so great that immediately after the addition of ferric chloride and shaking, a deep violet colour is produced with solutions containing $\frac{1}{100000}$ of salicylic acid, and even with $\frac{1}{800000}$ to $\frac{1}{1000000}$. This reaction is, therefore, as sensitive for salicylic acid as that of Millon's re-agent for phenol, and is very suitable for distinguishing phenol and salicylic acid if present in dilute solutions.

In a further communication, the author intends to deal with the practical uses attached to these reactions.

Determination of Alcohol in Ether and Chloroform. A. H. Allen. (*Journ. Chem. Soc.*, from the *Analyst*, October, 1877, 97.) 10 c.c. of the sample of ether are placed in a narrow test tube, a fragment of fuchsine is added, and the tube is corked. If there is no coloration, the ether is pure. If a coloration ensues, an equal volume of ether which has been treated with calcium chloride, and a fragment of fuchsine, are placed in a second similar tube. Alcohol is added in portions of one-tenth c.c. from a burette, until the tints are equal in both tubes. If the tints are not comparable, the tubes should be placed for a few moments in cold water. The alcohol

should drop into the liquid, not on to the sides of the tube. Each one-tenth c.c. of alcohol added may be considered as showing 1 per cent. of alcohol present in the sample. The results are accurate within one-fourth per cent.

The method could not be well applied to chloroform, because of the difficulty of getting this liquid perfectly pure.

A modification of the common process for determining alcohol in ether is also described. A little fuchsine is shaken up with water and a small quantity of ether in a glass-stoppered burette. Ether is insoluble in this liquid, but alcohol is dissolved by it. 10 c.c. are placed in a tube graduated in one-tenths c.c. 10 c.c. of the sample are added, and the tube is stoppered and well shaken. When the ether rises to the surface, its volume is read off. Each 0·1 c.c. of reduction in volume equals 1 per cent. of alcohol present in the sample. If the ether is coloured, the alcohol exceeds 20 per cent. In this case a fresh portion of the sample should be diluted with an equal bulk of pure ether, and the experiment repeated. The results are accurate to within 1 or 2 per cent.; they have been verified to 60 per cent. of alcohol.

The Tannin of Maté (Ilex Paraguayensis). A. Robbins. (*Amer. Journ. Pharm.*, 1878, 280.) The behaviour of this peculiar tannic acid with different reagents is as follows :—

With ferric salt it gives a bright green at first, turning to brown on standing, and a brown precipitate; with ferrous salts no change at first, becomes green on standing, and deposits very dark olive precipitate; with fixed alkalies transparent dark yellow colour, unchanged by heat, no precipitate; lime water gives a transparent pure yellow, and on standing a greenish brown precipitate; aqua ammoniæ gives a transparent intense yellow, almost brown, no precipitate; acetate of copper gives a light green precipitate, not soluble in excess of precipitant; sulphate of copper gives no precipitate in the cold, but when heated a brown precipitate is given; ammonio sulphate of copper slowly precipitates in the cold, and at once if heated; nitrate of silver is reduced by the aid of heat to the specular form; auric chloride is decomposed in the cold; barium nitrate gives a faint but immediate yellowish white precipitate; stannous chloride gives a white precipitate; tartrate of antimony and potassium produces no precipitate; sulphate of quinine and sulphate of cinchonine both produce white precipitates; gelatin gives no precipitate; acetate of lead gives a yellowish white precipitate; permanganate of potassium in solution is immediately decolorized; molybdate of ammonium produces a brownish red, which is changed

to yellow by oxalic acid; morphine gives a slight precipitate on standing; strychnine gives a white precipitate; aconitine gives no precipitate; veratrine with hydrochloric acid gives a white precipitate; salicin and santonin give no precipitate; piperin with hydrochloric acid, colour lightened but no precipitate; sulphuric acid, aided by heat, changes a concentrated solution to a deep red.

The Tannin of Ilex Paraguayensis. P. N. Arata. (*Gaz. Chim. Ital.*, vii., 520–530.) The following are the chief differences in the behaviour with reagents of ilex tannin and caffeotannic acid:— Acetate of lead produces a greenish yellow precipitate with the tannin of maté, and a bright yellow one with caffeotannic acid: barium hydrate, a green precipitate with the former and a yellow one with the latter; and with gelatin solution, caffeotannic acid forms but a very slight, and ilex tannin a very copious precipitate.

Ilex tannin appears to be a glucoside, as, when boiled with an acid or alkali, the solution reduces Fehling's test. The sugar thus formed is uncrystallizable. The author believes the tannin, when free from sugar, to be like gallotannic acid, a polyacid ether, or rather a mixture of polyacid ethers.

Russian Turpentine Oil and Oleum Foliorum Pini Sylvestris. Dr. W. A. Tilden. (From a paper read before the *Pharm. Soc.*, Dec. 5, 1877. *Pharm. Journ.*, 3rd series, viii., 447.) Russian oil of turpentine in the crude state possesses an odour which is quite distinct from that of other turpentine oils, and is strongly suggestive of "pitchpine" wood and sawdust. It is dextrogyre, and has a specific gravity of ·8682 at 15° C. After shaking up with solution of soda to remove acetic acid and empyreumatic products, a quantity of the oil was submitted to fractional distillation, with the following results:—

About 10 per cent. passed over between 160° and 170° C. The distillate after purification was found to have the same composition and nearly the same properties as common turpentine oil, but a stronger action on polarized light.

The greater part (about 63 per cent.) passed over from 171° to 172° C. This fraction had the same composition as ordinary oil of turpentine.

About 18 per cent. came over between 172° and 185° C., and contained high boiling hydro-carbons, polymeric with oil of turpentine.

In order to render Russian oil of turpentine available for pharmaceutical purposes, to which its fragrant odour specially commends it, it is only necessary to shake it up with a solution of soda, to

separate it, and then re-distill, either alone, or perhaps better, in a current of steam.

From the presence of empyreumatic products in the crude oil, it appears certain that this oil is not procured by exudation from the living trees, but is a product obtained in the distillation of tar from the wood of various coniferæ. According to Hanbury and Flückiger the *Pinus sylvestris*, or so-called Scotch pine, is chiefly employed for this purpose in the north of Europe.

Ol. fol. pini sylvestris has a specific gravity = ·8756 at 12° C. It is dextrorotatory.

$$[\alpha]_\nu = +6{\cdot}2 \ (\lambda = \text{decim.})$$

When distilled it began to boil below 100°, but the temperature went up rapidly to 165°. The first fractions obtained were as follows:—

(*a*) Below 165°	1 fluid oz.
(*b*) 165° to 175°	$2\frac{1}{8}$,,
(*c*) 175° to 195°	$\frac{3}{8}$,,
195° and upwards	$\frac{1}{4}$,,
	$3\frac{3}{4}$,,

After careful fractionation, two chief products were obtained,—

(*a*) Boiling at 156° to 159°, dextrorotatory; almost certainly identical with common turpentine.

(*b*) Boiling between 171° and 176°. This fraction has nearly the same odour and probably the same composition as the chief terpene from Russian turpentine. It is, however, lævo-rotatory in its action with polarized light.

From a pharmaceutical point of view, the chief results of these observations is to indicate that neither Russian nor any other turpentine oil of commerce can be said fairly to represent the oleum foliorum pini sylvestris, or to be a proper substitute for it. But the author believes that a preparation of Russian oil might be obtained by a single distillation, which would be found very suitable and agreeable for medicinal purposes.

Essential Oil of Tansy. G. Bruylants. (*Ber. der deutsch. chem.-Ges.*, xi., 449–456; *Journal de Pharmacie d'Anvers*, July, 1877.) The principal constituent of this oil is an aldehyde isomeric with camphor, and answering to the formula $C_{10}H_{16}O$, to which the author applies the term *tanacetyl hydride*. Besides this constituent, which amounts to about 70 per cent., the oil contains about 1 per cent. of a terpene of the formula $C_{10}H_{16}$, and about 26 per cent.

of an alcohol, $C_{10}H_{18}O$; and two resins, one of which is acid, the other neutral.

Essential Oil of Valerian. G. Bruylants. (*Ber. der deutsch. chem.-Ges.*, xi., 449–456.) This oil is shown to consist of a terpene, $C_{10}H_{16}$; an alcohol, $C_{10}H_{18}O$, isomeric with borneol; formic acetic, and valeric ethereal salts of the latter; and the ether $(C_{10}H_{17})_2O$.

Essential Oil of Angostura Bark. MM. Oberlin and Schlagdenhauffen. (*Journal de Pharmacie et de Chimie*, August, 1877.) The bark of *Galipea cusparia* yields nearly 2 per cent. of a volatile oil, which boils at 267° C., has a sp. gr. of 0·934, and is dextrogyre, its rotatory power being + 5·4°. When gently heated with iodine it forms a green mass, which gradually thickens. Chlorine also thickens the oil. With bromine it gradually changes to blue, purple, and brown; is ultimately converted into a hard friable mass. Chromic acid, with some ether and alcohol, produces a fine red colour; and ferric chloride, with ether, a carmine red, which disappears on the addition of more ether. An alcoholic solution of iodic acid develops a pink coloration changing to orange.

The Volatile Acids of Croton Oil. J. Berendes. (*Ber. der deutsch. chem.-Ges.*, x., 835–837; *Pharm. Centralhalle*, 1877, No. 38.) Geuther and Fröhlich presume that the tiglic acid which they found in croton oil was identical with Frankland and Duppa's methylcrotonic acid. The author has confirmed this statement. Both acids form plates having a peculiar smell like that of gum benzoin, melting at 64°, and boiling at 196°–197°. The calcium salts form small, foliated, warty masses, and contain 3 molecules of water; the barium salts are similar, but contain 4 molecules of water. The silver salts are white crystalline precipitates, and the two ethyl ethers boil at 154°–156°. By fusing with potash the acids are resolved into acetic acid and propionic acid. Bromine converts them into a dibromovalerianic (dibromomethylethylacetic) acid, melting at 82°–83°; and hydriodic acid forms moniodovalerianic acid, melting at 86·5°. They are not changed by the action of sodium-amalgam and water, but on heating them with hydriodic acid and phosphorus to 160°, methylethylacetic acid is formed, boiling at 173°–175°, and yielding an amorphous barium salt.

Artificial Oil of Mustard. Dr. C. Schacht. (*Wochenschrift. für Pharm.*, 1877, No. 28.) Some time ago Dr. E. Mylius stated that the impurities contained in the best commercial samples of artificial oil of mustard were such as to render the oil unsuitable for pharmaceutical purposes (see *Year-Book of Pharmacy*, 1877, 144). The impurities complained of were principally hydro-

cyanic acid, carbon bisulphide, and allyl trisulphide. These statements are now contraverted by the author, who ascribes the results obtained by Dr. Mylius to the fact that the oils examined by the latter did not represent the average quality obtainable in the market. A sample of the artificial oil prepared by Kahlbaum, of Berlin, and examined by Dr. Schacht, was found to be perfectly free from hydrocyanic acid and carbon bisulphide, to boil at 147°–148° C., to have a sp. gr. of 1·018; and indeed, to possess all the characters of the natural oil. It would thus appear that there is no reason whatever why the cheap artificial oil should not replace the natural oil in pharmacy.

Volatile Oil of Storax. J. H. van Hoff. (*Bull. Soc. Chim.* [2], xxv., 175; *Amer. Journ. Pharm.*, 1877, 553.) The author corroborates Bertholet's observation that this oil is lævogyre, but finds it due to *styrocamphene*, probably $C_{10}H_{18}O$, of which storax yields only 1–20 per cent. It boils between 170° and 180° C., and solidifies at about 10° C. Bertholet found the volatile oil to contain *styrolene*, which E. Kopp regards to be identical with *cinnamene*.

Oil of Limes. C. H. Piesse and Dr. C. R. A. Wright. (*Journ. Chem. Soc.*, Nov., 1877.) This oil is obtained from the rind of the fruit of *Citrus Limetta* in the same way as the kindred ottos of orange and lemon, viz., by rasping the unripe fruits by rubbing them over a perforated concave metal rasp fixed over a basin. The pulp thus obtained is squeezed in a press, and the otto which exudes purified by filtration; in this state it has the peculiar sweet, sharp odour characteristic of the fruit. Ottos thus obtained are commercially more valuable than essential oils prepared by distillation from the same fruits, or from the residues left in this operation, having a more delicate perfume. The sp. gr. of this oil was found to be 0·905; its boiling point is between 181° and 186° C.

Distillation of Castor Oil under Reduced Pressure. F. Krafft. (*Ber. der deutsch. chem.-Ges.*, x., 2034–2036.) Castor oil, when subjected to distillation under a very low pressure, yields about 35–50 per cent. of a colourless oily distillate, consisting of œnanthol. After this has passed over, the thermometer rapidly rises above 100° C., and now yields a distillate which, solidifying to a crystalline mass, fuses at 24·5° C. and has a composition represented by the formula $C_{11}H_{20}O_2$. The formation of this new fatty acid and of œlanthol is explained by the following equation:—

$$C_{18}H_{34}O_3 = C_7H_{14}O + C_{11}H_{20}O_2.$$

The final portions of the distillate, passing over at 250°–265° C.,

have not yet been examined. The residue in the retort solidifies into a spongy saponifiable mass.

Volumetric Estimation of Chromium. F. Jean and H. Pellet. (*Bull. Soc. Chim.* [2], xxvii., 200–205; *Journ. Chem. Soc.*, 1877, 354.) The theory of the process adopted by the authors is briefly as follows:—

1. If a neutral solution of an alkaline chromate be treated with baryta water, an insoluble precipitate of barium chromate is formed, and the alkali which was previously combined with the chromic acid is set free.

2. If the excess of barium in the above solution be precipitated by carbonic acid, the solution boiled, and the barium carbonate filtered off, the filtrate contains all the alkali in the state of carbonate which was previously combined with the chromic acid.

3. From the titration of the alkaline filtrate mentioned above, with normal sulphuric acid, the corresponding amount of chromic acid is obtained.

The Process.—One gram of finely powdered, levigated chrome iron ore is heated to redness with from 12 to 15 grams of pure fused sodium carbonate for twenty minutes (if the mineral be properly pulverised, the decomposition should be complete; but a second fusion will be necessary if undecomposed chrome iron be present). The fused mass is exhausted by boiling with water, the ferric oxide filtered off, the filtrate concentrated to about 400 c.c., hydrochloric acid carefully added until there is only a slight alkaline reaction, and the whole refiltered (if necessary) and diluted so as to measure 500 c.c. Of this solution, 250 c.c are exactly neutralised with a few drops of dilute hydrochloric acid, and 50 c.c of pure baryta water added; some carbonic acid water is then added, and the whole boiled for a quarter of an hour in order to expel the excess of carbonic acid. When the solution is cold, it is diluted with water until it again measures 500 c.c.; filtered, and 250 c.c. of the clear filtrate titrated with a standard sulphuric acid containing 12·58 grams of $S.O_4H_2$. 100 c.c of this acid are equivalent to 0·25 gram CrO_4H_2, and the number of cubic centimeters used corresponds exactly with the percentage of chromate of potassium which the chrome-iron would furnish.

The following co-efficients may be used with advantage in the calculations:—

$$Cr_2O_3 + 2{\cdot}545 = K_2O.CrO_3.$$
$$K_2O.CrO_3 + 0{\cdot}3928 = Cr_2O_3.$$

The following precautions must be taken:—

1. The sodium carbonate and hydrochloric acid used must be free from sulphuric acid, phosphoric acid, and calcium salts.

2. If a turbidity be observed on the addition of the standard sulphuric acid, the assay must be recommenced, as the carbonate of barium has not been completely precipitated on account of insufficient boiling.

3. The baryta water must be free from potash or soda, or at all events the amounts of these alkalies present must be accurately determined and deducted from the total alkali found.

The above process is applicable to the assay of insoluble chromates, which are decomposed by fusion with alkaline carbonates.

Chromic Acid as a Reagent for Malic Acid. G. Papasogli and A. Poli. (*Gazetta Chimica Italiana*, 1877, vi.; *Chem. News*, 1877, 109.) If to 5 c.c. of water containing a few milligrams of malic acid, free or combined, a few drops of dilute sulphuric acid are added, along with a crystal of bichromate of potash, and the liquid is raised to a boil, it passes from a yellow to a green colour, emitting a distinct odour of the ripe fruit. As this reaction is not common to the citric and succinic acids, it might be employed with good success for the detection of malic acid when mixed with the two others. The authors recommend the following modification of the process of Fresenius:—Having obtained the precipitate of the calcic salts of the acids in alcohol, the latter body must be completely driven away, when a small quantity of the precipitate is taken, treated with dilute sulphuric acid, the precipitate of sulphate of lime produced is filtered off, and to the filtrate a small crystal of bichromate of potash is added, and the liquid is several times raised to a boil. It is then needful to observe —(1) If the liquid still remains of a yellow colour, even after a prolonged ebullition, this indicates the presence of succinic acid alone. As a check test the remnant of the precipitate may be tested with ferric chloride. (2) If the liquid passes from a yellow to a green without giving off the smell of ripe fruit, this indicates the presence of citric acid, alone or accompanied with the succinic. (3) If the liquid turns green, and gives off the odour of ripe fruit on cooling—an odour which recalls that of medlars when fully mature —the presence of citric acid is indicated.

Chlorophyll. E. Fremy. (*Comptes Rendus*, lxxxiv., 983–988; *Journ. Chem. Soc.*, 1877, 629.) In this, his third communication on the subject, the author continues his examination of the two distinct substances which he has found to co-exist in the green colouring matter of leaves. The one of these—a yellow substance, called by

the author *phyllocyanthin*—is extracted from chlorophyll by alcohol of 62°, which leaves undissolved the other body, a bluish green substance, to which the name of *phyllocyanic acid* is given. This substance is insoluble in alcohol of 62°, but is dissolved by alcohol of 70°. When also an alcoholic solution of chlorophyll is treated with a mixture of hydrochloric acid and ether, the ether dissolves out the phylloxanthin, and acquires a yellow colour, while the hydrochloric acid dissolves the phyllocyanic acid, and acquires a beautiful blue tint. If to a solution of chlorophyll in alcohol, a few drops of baryta water be added, a deep green barium salt of phyllocyanic acid is precipitated, whilst the alcohol acquires a fine golden yellow colour from the phyllocyanic acid that remains in solution. The author now sees reason to believe that these two coloured substances exist in chlorophyll, in a state of simple admixture. The green colouring matter he has found contains potash, and therefore he terms it phyllocyanate of potassium. He was, however, unable by any means to isolate phyllocyanic acid, although he produced the potassium compound synthetically by double decomposition; and this was found to possess the spectroscopic and other properties of the green sIbstance extracted from leaves by alcohol.

Mercuric Chloride Contaminated with Arsenic. J. G. Smith. (*Amer. Journ. Pharm.*, 1877, 397.) Experiments made in the laboratory of the Philadelphia College of Pharmacy with commercial corrosive sublimate have demonstrated its frequent contamination with arsenic. This impurity, which most likely is derived from the sulphuric acid used in preparing the mercuric sulphate, from which afterwards the mercuric chloride is sublimed, is usually present in such small proportion that it is not readily recognised by treating the precipitated sulphides with sulphydrate of ammonium; but in Marsh's apparatus or by Fleitmann's test, its presence is very easily demonstrated.

Determination as Sulphide.—The acidulated solution was completely precipitated by sulphuretted hydrogen, the precipitate treated with ammonium sulphide, the filtrate acidulated with acetic acid, and the precipitate collected, washed, dried, and weighed. It was then oxydized with nitro-muriatic acid, the separated sulphur weighed as such, while the portion dissolved was estimated as barium sulphate. The entire weight of the sulphur thus ascertained was then deducted from the weight of the precipitate by acetic acid, and the difference, being metallic arsenic, calculated to arsenic acid.

Determination as Lead Arseniate.—The solution was precipitated by hydrogen sulphide, the precipitate treated with ammonium sul-

phide, and the filtrate evaporated to dryness. The residue was oxydized with nitric acid, heated upon a sand bath until the sulphur and excess of nitric acid had evaporated, then thoroughly mixed with an excess of recently ignited pure oxide of lead, heated to dull redness (care being taken to prevent loss by decrepitation), and weighed. From this weight was deducted the previously ascertained weight of the crucible and lead oxide, the difference being the weight of the arsenic acid.

Five samples were examined for arsenic, with the following results:—

Determined as	I.	II.	III.	IV.	V.	
Sulphide . . .	·0537	·048	·032	·083	·0901	per cent. of
Lead Arseniate . .	·054	·052	·0333	·091	·0962	Arsenic Acid.

The Detection of Resin as an Adulterant in Bees' Wax. Dr. E. Schmidt. (*Ber. der deutsch. chem.-Ges.*, x., 837.) Five grams of the wax are heated in a flask, with 20 to 25 grams of crude nitric acid, sp. gr. 1·32, and boiled for one minute. An equal volume of cold water is now added, and, with constant agitation, an excess of ammonia; the liquid is separated from the wax, and poured into a glass cylinder: it has a yellow colour if the wax was pure, and a more or less intense brown one if resin was present. One per cent. of the latter may thus be readily detected, particularly if the resulting colour is compared with that produced by pure wax. Nitric acid acts much more energetically upon resin than upon wax.

This process is a modification of Donath's method, published in 1872.

Copper in Olive Oil. C. Cailletet. (*Pharmacent. Centralhalle*, No. 42.) Copper is occasionally added to olive oil as a colouring agent, and may be most readily detected in it by mixing 10 c.c. of the oil with a solution of 1 decigram of pyrogallic acid in 5 c.c. of ether. In the presence of copper, a brown coloration will thus be produced.

Assay of Cacao and Chocolate. E. Heintz. (*Archiv der Pharm.* [3], x., 506.) The fat is estimated by exhausting 20 grams of the cacao or chocolate with benzin, evaporating the solution, and weighing the residue. The undissolved portion is frequently treated with water of 15° C. until completely exhausted, when the residue may be examined microscopically for foreign starches, and for the spiral vessels and dark red cells of cacao shells, the residue is then washed with strong alcohol, dried and weighed. By adding its weight to the weight of the fat, and then adding ·8 gram as the average amount (4 per cent.) of cacao constitutent soluble in

water, and deducting the sum from 20, the quantity of sugar is found by the difference.

The next step is the determination of the ash, which in cacao dried at 25° C. should not yield more than 4 per cent. Pure cacao yields 1·8 to 4 per cent. (the quantity varying according to its source); cacao partly deprived of its fat from 4 to 5·5 per cent., but not more; and pure chocolate not more than 1·5 to 1·7 per cent. An adulteration with cacao shells would greatly increase the ash, as in these it amounts to from 8·5 to 18·5 per cent.

The Chemistry of Cacao Butter. Two New Fatty Acids. C. T. Kingzett. (*Chem. News*, xxxvi., 229.) The specimen of cocoa-butter examined was hard, imperfectly transparent, slightly yellowish, melting at about 30° C., and when once melted remaining liquid for some time at a lower temperature: it contained no volatile or soluble fatty acids. The acids were prepared by saponifying the butter, and decomposing the soaps with dilute sulphuric or hydrochloric acid. They were purified by recrystallization from alcohol, fractionating, etc. Many analyses and melting points of products obtained are given. The extreme acids found were represented by the formulæ $C_{12}H_{24}O_2$ and $C_{64}H_{128}O_2$. The first is the formula of lauric acid, but it melts at 57·5° (lauric acid melting at 43° C.) so it must contain some acid of a higher melting point than lauric acid, and therefore the acid itself must be lower in the series $C_nH_{2n}O_2$ than lauric acid. The highest known acid in this series is melissic acid, $C_{30}H_{60}O_2$; the new acid has a formula not lower than $C_{64}H_{128}O_2$. Many salts of these acids were prepared, but details as to their composition are reserved for a future communication. The lower acid crystallizes in pearly plates or fine long needles. The higher acid—for which the author proposes the name of "theobromic acid"—crystallizes in microscopic needles or granules, melts at 72·2° C.; at a high temperature distils apparently unchanged, and is somewhat electric when dry, a property which is possessed in a high degree by its silver salt. The total fatty acids of cocoa-butter contain about 20 per cent. oleic acid. The author, in conclusion, points out that text books state that "cocoa-butter yields, almost exclusively, stearic acid." From the present investigations it is clear that this statement is entirely incorrect. It is based on determinations of the melting point of the fatty acids obtained.

Solubility of Sugar in Water. H. Courtonne. (*Journ. de Pharm. et de Chim.* Jan., 1878.) The author has redetermined the solubility of sugar, and finds that 100 parts of water dissolve 198·6 parts of

sugar at 12·5° C., and 245 parts at 45° C. A saturated solution made at the first-named temperature would thus contain 66·5 per cent. by weight, and one prepared at 45°, 71 per cent. by weight, of sugar.

Veratrum Alkaloids. A. Tobein. (Beiträge zur Kentniss der Veratrum Alkaloide. Inaugural Essay. Dorpat, 1877, 8vo, 38. *Amer. Journ. Pharm.*, 1878, 122.) This interesting essay, of which the following is only a brief abstract, opens with an historical introduction, citing the literature of the chemical investigations made with different species of veratrum. The poisonous properties of *Veratrum album* were known in Spain in the sixteenth century, the rhizome being called *de balestera* or *de jerva*, and it is possible that the *charbak abjadk* of the Arabian physicians was the same drug. Since veratrum is not indigenous to Greece, the helleboros of the ancient Greeks was most likely not identical with the former.

Peiletier and Caventon examined *Veratrum album* in 1819, and announced the presence of veratrine. In 1837 Edward Simon corroborated the presence of veratrine, and found another alkaloid which he called *barytine* (from its behaviour to sulphuric acid), changing the name afterwards to *jervine*. H. Will (*Ann. der Pharm.*, xxv.) examined jervine, and from his analysis gave it the formula $C_{60}H_{15}N_2O_5$, which was changed by Limpricht ("Grundriss der Org. Chem.," 1862) to $C_{60}H_{16}N_2O_6$. In 1842 A. Wiegand confirmed the presence of veratrine and jervine in *Veratrum album*. The same results were arrived at by Herm. Weppen, in 1872, and in the same year Schroff, jun., announced the presence of veratrine in *Veratrum Lobelianum;* while Dragendorff, in 1871, found the second alkaloid (beside jervine) to differ from veratrine, and subsequently announced the presence of jervine also in *Veratrum nigrum.**

The author first examined the rhizomes of *Veratrum Lobelianum*, partly collected from wild plants in Austria, partly from cultivated ones in Russia, in both of which Dragendorff had already found notable quantities of veratroidia. The process adopted was as follows:—

Two kilos of the coarsely powdered rhizome were mixed to a soft mass with sufficient water containing 36·8 grams phosphoric acid, sp. gr. 1·23, macerated for twenty-four hours, mixed with 7·5 kilos of alcohol of 95 per cent., the mixture digested in a water bath for eight hours, cooled and expressed; and the press cake similarly treated with

* The literature of the investigation of *Veratrum viride* is given in full. We omit it here, as our readers will find it represented in the reports by C. L. Mitchell, C. Bullock, and Prof. Wormley (*Year-Book of Pharmacy*, 1874, 102.)

12 kilos of alcohol of 70 per cent., and 15 grams of phosphoric acid. The united liquids were filtered, the alcohol distilled off in vacuo, the residue concentrated to a syrupy consistence, mixed with three times its weight of water, the resin filtered off after several hours, and the filtrate rendered alkaline by sodium carbonate. The precipitate was separated from inorganic salts by solution in alcohol, the filtrate diluted with an equal part of water, digested with recently ignited animal charcoal, and the faintly wine-yellow filtrate evaporated, when a yellowish crystalline mass, *A*, was left. The alkaline filtrate from the above precipitate was agitated with chloroform, this solution separated and the chloroform evaporated, leaving an amorphous light yellowish residue, *B*.

A proved to be jervine, containing some veratroidine, while *B* was a mixture of veratroidine with some jervine. *A* was dissolved in dilute acetic acid, filtered, and mixed with dilute sulphuric acid until a distinct turbidity appeared. The yellowish white granular precipitate, collected after several hours, was jervia sulphate not yet quite pure. The filtrate was rendered alkaline by ammonia, and agitated with chloroform, which left but a slight amorphous pale yellow residue.

B was contaminated with wax, and contained so little jervine that its solution in acetic acid gave no precipitate with sulphuric acid; through an accident it was lost.

The resin collected as above from the concentrated liquid, after dilution with water, still contained alkaloid. To obtain this, Bullock's method (*ibid*, 1876, 147) was tried with indifferent success. To the powdered resin mixed with an equal weight of lime, enough water was added to produce a soft mass, and this dried at 40° C. (104° F.). From the powdered lime resin soap the alkaloid could be extracted with ether, but hot 85 per cent. alcohol was also found serviceable. The alcohol was partly distilled off, then dilute acetic acid added, and all alcohol evaporated; the filtrate was treated with sodium carbonate, the precipitate, *C*, washed, freed from lime by dissolving in alcohol, and this solution evaporated.

The alkaline filtrate from *C* was agitated with chloroform, which, on evaporation, left an amorphous light coloured residue, consisting of veratroidine with a little jervine. *C*, consisting of veratroidine with larger quantities of jervine, was dissolved in dilute acetic acid, the solution divided into three parts, which were precipitated respectively with muriatic acid, sp. gr. 1·2, nitric acid sp. gr. 1·13, and diluted sulphuric acid (1 to 7 of water). The filtrates were mixed and marked *D*, the brown-red soft granular precipitates

were, after Bullock's recommendation, freed from resin with 95 per cent. alcohol, and the residue dissolved in boiling strong alcohol, previously diluted with an equal part of water. The filtered solutions left on spontaneous evaporation, crystals agreeing with those figured by Bullock and Wormley.

Pure jervine was obtained from the nitrate by treating it with a warm solution of sodium carbonate, and purifying the alkaloid with strong alcohol, when it formed perfectly white needles, which by ultimate analysis gave results leading to the formula $C_{13}H_{23}NO_4$, or more closely to $C_{27}H_{47}N_2O_8$ (O = 16). The sulphate and hydrochlorate have the composition $C_{27}H_{47}N_2O_8, H_2SO_4$ and $C_{27}H_{47}N_2O_8$, HCl.

The acid filtrate *D* was precipitated with sodium carbonate, and the precipitate freed from jervine, as recommended by Bullock, by dissolving in acetic acid and treating with potassium nitrate; the filtrate was rendered alkaline by sodium carbonate and agitated with chloroform; a small quantity of light yellow amorphous veratroidine was obtained, showing the following reactions:—

Concentrated sulphuric acid gave a yellow solution, passing through light brown-red into deep raspberry red.

Concentrated muriatic acid yielded a light yellowish rose-red solution, which, on heating, became dirty yellow, and with sulphuric acid and heating, brown-red.

Concentrated nitric acid produced a light yellow solution, which with sulphuric acid and on being heated turned transiently orange-red and passed into lemon-yellow.

The author observed that small quantities of veratroidine, also of veratrine, will materially modify the reaction of jervine, and commercial jervine seems often to contain one or both of these alkaloids. Veratroidine is dissolved by cold concentrated muriatic acid with a pale rose-red colour, which, when heated, is rapidly discoloured Veratrine, on the contrary, dissolves in cold muriatic acid colourless, an intense and lasting red coloration being produced by heat, and this is likewise the case with sabatrine and sabadilline.

Veratroidine is rather freely soluble in water, freely in alcohol ether, and chloroform, little in petroleum ether (gasolin), somewhat more in benzin and amylic alcohol. It dissolves in water to about the same extent as sabadilline, less than sabatrine and more freely than veratrine; it differs from sabadilline by its greater solubility in ether.

The two alkaloids, jervine and veratroidine, were also found in cultivated old and recent rhizomes, and in the young leaves of

Veratrum Lobelianum, and in the dried rhizome of *Veratrum album*, which yielded little jervine and more veratroidine.

Jervine is very sparingly soluble in water and in solution of sodium carbonate, freely in alcohol and in chloroform, less in amylic alcohol and benzin, very little in ether, and almost insoluble in petroleum. When pure, it is dissolved by concentrated sulphuric acid with a yellow and finally light green colour. Concentrated hydrochloric and nitric acids cause no change in the colour; but hydrochlorate of jervine, thrown into concentrated nitric acid, produced an evanescent rose colour. Potassium nitrate indicates jervine already when in dilution of 1 in 1200.

The results of the ultimate analysis of veratroidine point to the formula $C_{51}H_{78}N_2O_{16}$ or $C_{24}H_{37}NO_7$. Its action upon frogs is similar to that of veratrine, but much more energetic than that of either sabadilline or sabatrine.

The composition of the above alkaloids, as ascertained by Weigelin and Tobien, is the following :—

Veratrine	$C_{52}H_{86}N_2O_{15}$, W.
Veratroidine . . .	$C_{51}H_{78}N_2O_{16}$, or $C_{24}H_{37}NO_7$, T.
Sabatrine	$C_{51}H_{86}N_2O_{17}$, W.
Sabadilline	$C_{41}H_{66}N_2O_{13}$, W.
Jervine	$C_{27}H_{47}NO_3$, T.

Even if the molecular values of the formulæ should on further investigation be altered, this is evidently a natural group of alkaloids, somewhat similar to those of opium and cinchona. The first four show a great similarity in their behaviour to sulphuric acid; but with sugar and sulphuric acid, pure veratrine yields a green, afterwards blue coloration, while veratroidine gives a black-brown colour, which lasts for some time.

Veratrine, sabatrine, and sabadilline, agree in their behaviour to muriatic acid; but veratroidine and jervine differ widely from it. In their action veratrine, veratroidine, and perhaps jervine, are nearest related to each other; but the latter is distinctly characterized by its behaviour to sulphuric, muriatic, and nitric acids.

Meconoiosine, a New Derivative from Opium. T. H. Smith. (*Pharm. Journ.*, 3rd series, viii., 981.) In the final isolation of meconine, the oleaginous-like liquid containing it, upon being left to itself for some days, sets into a mass of crystals. These crystals, upon being drained and cautiously washed with cold weak spirit, are to be boiled in a large quantity of water. The filtered liquid gives a crystallization of meconine, and the mother-liquor, when concen-

trated, and upon being set aside for a time, yields beautiful leaf-like crystalline masses of the body to which the name of meconoiosine has been given.

This remarkable crystalline form, which in its impure state is assumed by meconoiosine, as well as the brown colour of the crystals, enables this body to be readily distinguished from the soft and nearly white meconine which crystallizes along with and upon it, in a manner not unlike the incrustation of minute shells upon a rock. If this meconine be now removed, the meconoiosine, by means of a few crystallizations from hot water, with the aid of charcoal, may be obtained in the pure state, free from colour.

This substance is especially interesting because that now in it a second chemically indifferent body, existing in opium, is met with. Hitherto meconine alone has been distinguished by this characteristic. Moreover, the respective chemical constitution of those two opium products reveals an apparent relation: meconine being represented by the formula $C_{10}H_{10}O_4$, and meconoiosine by that of $C_8H_{10}O_2$. Both bodies are freely soluble in alcohol and ether; but as regards their solubility in water, the two substances present a striking contrast. Meconine is very slightly soluble in cold water, and in boiling water, unless in the proportion of about 1 in 50, it refuses to dissolve, remaining at the bottom of the liquid, like a heavy oil. Meconoiosine, on the other hand, is soluble in 27 parts of cold water, while in boiling water it is soluble to almost any extent; forming, as the heat rises and before being shaken up, a syrupy solution at the bottom of the liquid.

The authors have not yet ascertained the boiling point of meconoiosine, but it has been heated to 280° C. without boiling. It melts at 88° C. When heated with slightly diluted sulphuric acid, and when the evaporation has reached a certain point, meconine produces a beautiful green colour. With meconoiosine, under the same circumstances, the coloration is deep red, becoming purple.

A woodcut illustrating the impure crystals of meconoiosine may be seen in the original article.

Note on the "Saponin" of Sarsaparilla. Prof. F. A. Flückiger. (*Archiv der Pharm.*, 1877, vii., 532–548.) The author reviews the chemical history of *parillin*, and recommends its preparation by exhausting the crushed root with warm alcohol, and distilling the tincture until the residue weighs one-sixth of the root. It is then gradually mixed with one and a half times its weight of water, and after several days the liquid is decanted from the light yellow precipitate, which is then mixed with about half its volume of alcohol,

transferred to a filter and washed with alcohol of 20 or 30 per cent. Parillin is less soluble in weak than in strong alcohol or water. It dissolves very slightly in cold, but readily in hot water, without crystallizing on cooling; from boiling alcohol, sp. gr. 0·970, it crystallizes in needles. The yield was 0·18 and 0·19 per cent.

Concentrated sulphuric acid yields a yellow solution, which, on absorbing moisture, gradually turns cherry-red; warm diluted sulphuric acid colours parillin greenish, then red, and finally brown; phosphoric acid has a similar reaction, but the colour is more of a green-yellow. The aqueous solution is precipitated by alcoholic solution of lead acetate, by lead subacetate, and by tannin, and when warmed reduces alkaline copper tartrate, but does not react with other tests for sugar until after it has been boiled with a dilute acid, when the solution acquires a green fluorescence. This is best observed if a trace of parillin be dissolved in warm concentrated sulphuric acid, and disappears on dilution with water or on neutralizing with ammonia. The decomposition product, *parigenin*, is insoluble in water, the sugar appears to be partly crystallizable. Parillin is not sternutatory; its acrid taste is best observed in alcoholic solution.

The author compares the properties and analytical results of the above, and other similar bodies like saponin, senegin, cyclamin, digitonin, which are possibly homologous compounds.

Rapid Determination of Potash and Soda. F. Jean. (*Moniteur Scientifique Quesneville*, 1877; *Chem. News*, 1877, 143.) The saline mixture in which it is desired to determinate the potash with the soda is ground up with an excess of sulphate of ammonium, moistened with a few drops of water, heated to redness in a platinum crucible till the ammoniacal salts have completely disappeared, and treated once more with sulphate of ammonium in the same manner, so as to ensure the expulsion of all acids capable of displacement by sulphuric acid. The substance is then dissolved in boiling water, a slight excess of baryta water is added, and the sulphates and insoluble matters removed by filtration. The filtrate is then treated with a little seltzer water, and kept at a boil till all excess of carbonic acid has been expelled, and all the carbonate of baryta rendered insoluble. On filtering the solution the potash and soda remain in the filtrate in the state of carbonates, and are exactly neutralized with a standard solution of hydrochloric acid at the boiling point. In this neutral liquid the weight of the chlorides present is determined by bringing the solution, by evaporation or by the addition of water, as the case may be, to a volume of 50 or 100 c.c., the specific gravity

of which is then determined. Or the solution may be evaporated to dryness, and the residue may be weighed. Knowing, therefore, from the quantity of hydrochloric acid used in titration, the weight of chlorine corresponding to the two alkalies and the weight of the two chlorides, it is easy to calculate the proportions of potash and soda. If the chlorine found is multiplied by 2·1029, the weight of the chlorides subtracted from the product, and the remainder multiplied by 3·6288, the weight of sodium chloride is obtained, whilst the difference will be the potassium chloride. If it be required to determine alkalies in the presence of a super-phosphate, it is prudent to neutralize with baryta water previous to the treatment with sulphate of ammonium, to prevent the formation of pyrophosphates.

Action of Anhydrous Acids (Anhydrides) upon Anhydrous Bases. M. J. Bechamp. (*Chem. News*, 1877, 221.)

1. *Action of the Anhydrous Mineral Acids upon Anhydrous Mineral Bases.*—M. Bussy has already shown that sulphate of baryta may be formed by bringing in contact anhydrous sulphuric acid and anhydrous baryta. Borate of lime may even be formed by projecting anhydrous lime into anhydrous boric acid in a state of tranquil fusion. The combination is accompanied with the evolution of heat and light.

2. *Action of Anhydrous Organic Acids upon Anhydrous Mineral Bases.*—The author has caused anhydrous acetic, butyric, and caproic acids to act upon anhydrous oxides of calcium, barium, lead, and mercury.

3. *Action of Acetic Anhydride upon Anhydrous Lime.*—The base mixed with an excess of absolutely pure acid is introduced into a green glass tube; a thermometer is plunged in the mixture, and the tube is then sealed over the lamp. It is then heated to 133° in a bath for four hours. The internal temperature of the tube rises to 141°, and remains there for about twenty minutes. The mass increases in volume, and the lime is *slaked* in the anhydrous acid. The product, freed from excess of acid, and dissolved in water, crystallizes like acetate of lime, and has its composition. Acetic anhydride combines directly with anhydrous baryta at 100°. Butyric and caproic anhydrides combine directly with anhydrous lime at 120°. The quantity of the salts obtained, as calculated from the weight of lime employed, is almost theoretic. Acetic anhydride also unites completely with perfectly dry oxides of lead and mercury. The salts obtained, which are almost theoretic in quantity, when freed from excess of acid, dissolve in water, and crystallize with their peculiar characters. In the experiment with oxide of mercury,

the temperature of 105° must not be exceeded. In an instance where this was done the substance was blackened, and the tube burst on being opened. This fact will be considered on a future occasion.

4. *Action of Anhydrous Mineral Acids upon Anhydrous Oxides of Organic Radicals.*—The author has not experimented upon this particular case, affirmative instances being already known. MM. Dumas and Peligot obtained sulphate of methyl by the direct action of sulphuric anhydride upon oxide of methyl. M. Wetherill produced sulphate of ethyl by passing the vapour of anhydrous sulphuric acid into anhydrous ether.

5. *Action of Anhydrous Organic Acids upon the Anhydrous Oxides of Organic Radicals.*—These combinations are obtained with difficulty, and the action of prolonged heat is required. M. Wurtz has combined directly oxide of ethylen with anhydrous acetic acid, obtaining ethylenic acetate and propyl-ethylenic acetates. The author has combined directly anhydrous butyric and acetic acids with anhydrous oxide of ethyl. The ethers obtained have the same characters and the same boiling-point as those obtained by the ordinary methods.

Adulteration of Santonin with Boracic Acid. (*Amer. Journ. Pharm.*, 1878, 37.) The *Lyon Medical* says that the high price of santonin has led to its adulteration with boracic acid, and that nearly 25 per cent. of the acid has been found in some parcels. The crystals of the two bear some resemblance, but it is easy to detect the fraud by exposing the article to the light for several days, when the crystals of santonin will become yellow from the formation of photo-santonic acid, whilst the other crystals will remain unchanged. Further, pure santonin burns without residuum. If the mixture be calcined and the product treated with boiling water, boracic acid crystals will be deposited on cooling. Chloroform will dissolve santonin, but not boracic acid.

Note on Cubebin. H. Weidel. (From *Wien Akad. Ber.*, lxxiv., 377.) Cubebin, $C_{10}H_{10}O_3$, is converted by nitric acid into oxalic and picric acids, while it yields, with nitrous acid, small yellow crystals of $C_{10}H_9(NO_3)O_3$, which are soluble in ether, alcohol, ammonia, and potassa; the latter solution having a purple colour. If cubebin is dissolved in chloroform, and bromine added, drop by drop, $C_{10}H_7Br_3O_3$ separates, which is insoluble in the common solvents, and obtained in white crystals from boiling xylene. When fused with HKO, carbonic, acetic, and protocatechuic acids are obtained; the same products were yielded, under similar cir-

cumstances, by ferulic acid and eugenol, into which compounds, however, cubebin could not be converted.

Detection of Artificial Colouring Matters in Wine. E. J. A. Gautier. (*Journ. de Pharm. et de Chim.* [4], xxv., 8–12, and 102–106; *Journ. Chem. Soc.*, 1877, 935.) The following reactions should be tried with strongly clarified wines, as was shown at the head of the table in a previous paper (*Chem. Soc. Journ.*, 1876, ii., 438).

Pernambuco or Brazil Wood.—Wines coloured with these substances are not decolorized, even after being clarified with two or three times as much albumen as is indicated in the table (*loc. cit.*); they assume a yellowish colour, which changes to a fine red in the air. The reactions with sodium carbonate, ammonia, borax, and alum are very sensitive. If a small piece of silk, thoroughly cleansed from gum, is washed with dilute tartaric acid, and soaked in the wine for twenty to twenty-four hours, and then dried at 60°–70°, it will appear of a distinctly maroon or reddish lilac colour, whilst in the case of an unadulterated wine it will remain wine coloured, or lilac. If silk thus dyed by wine coloured with Brazil wood be then soaked in dilute ammonia, it will become reddish lilac; whilst the silk dyed in pure wine will change to dark grey, with scarcely a trace of the original colour. If lime water is substituted for ammonia, the silk from the adulterated wine will become greyish, that from pure wine of a dingy yellowish red colour. If the coloured silk be soaked in aluminium acetate solution, and then heated to 100°, it will retain its wine red lilac colour, a reaction which distinguishes wine thus coloured from that coloured with Brazil wood. Brazil and logwood are not employed to any extent in the countries where wine is largely produced.

Logwood.—If the colour due to logwood is in excess in the wine, ammonia imparts a violet tint to it. Wine coloured with logwood imparts to silk which has been treated as described above a reddish or maroon lilac colour, which is changed to a violet lilac tint by dilute ammonia, and to a bluish violet by aluminium acetate.

Cochineal.—The change to rose colour on addition of 10 per cent. alum solution is characteristic. Sodium carbonate imparts a lilac-brown colour, but entirely destroys the vinous or red colour due to *phytolacca*. If a piece of dressed silk be mordanted with aluminium acetate, and immersed for twenty hours in the wine, and then dried at 100°, the colour imparted is violet wine red, very like that given by pure wine. It does not change colour with copper acetate (showing absence of fuchsine). If soaked in a dilute solution of zinc

chloride heated to 100°, washed with sodium carbonate, then with water, and dried, it assumes a purple colour; whilst with pure wine it remains of a dull, lilac-grey. The absorption bands of cochineal cannot be distinguished with certainty until more than 12 per cent. of the total colour of the wine is due to cochineal. Cochineal is rapidly precipitated in the lees of the wine.

Fuchsine.—Aniline colours are so extensively used for wine colouring, that they should be looked for even after the detection of other colouring substances. Fortunately they are easily detected by adding ammonia, shaking with ether, and adding acetic acid to the partly evaporated ether solution, when a rose or violet-red colour is produced.

To detect mere traces of fuchsine by this test, the ammonia must be added in quantity more than sufficient to saturate the wine, and gentle heat must be applied. Faure states that there is a yellow colouring matter in wine which produces a solution in ether, at first colourless, but becoming red, and at last violet, on exposure to air and light: hence the preceding processes must be carried out as rapidly as possible.

Another process for detecting fuchsine consists in separating the fuchsine by means of amylic alcohol from the liquid obtained by adding subacetate of lead to the wine, and filtering. Yvon separates the colouring matter by shaking the wine with animal charcoal, filtering, washing the charcoal with water, and then extracting the colouring matter by alcohol; the colouring matter is entirely removed from 10 grams of wine by 1 gram of charcoal.

Wine coloured with fuchsine imparts a rose colour to the "dressed" silk, pure wine giving a more violet tint. The former becomes yellow when treated with hydrochloric acid, and reddish violet if dried at 100°; after having been treated with dilute copper acetate solutions, the silk dyed with pure wine becomes bright rose with the acid, and greyish violet by treatment with copper acetate and drying at 100°.

Arsenic should always be looked for in wines containing aniline colours. Fuchsine is rapidly precipitated from all wines when they are kept.

Phytolacca.—This fraud is less frequent than it was several years ago. The reddish or lilac colorations given by aqueous solutions of sodium carbonate or borax, or better still by sodium bicarbonate, are very sensitive. The lake obtained by adding alum and sodium carbonate assumes a violet tint when the coloration due to phytolacca amounts to 25 per cent. of the total colour-intensity of the wine.

Duclaux finds that nascent hydrogen decolorizes wine falsified by phytolacca: the author succeeded in decolorizing a diluted wine containing phytolacca in twenty-four hours, by zinc and hydrochloric acid. The colorations imparted by fuchsine and cochineal are also decolorized by nascent hydrogen, although more slowly.

Althæa Nigra, or Mauve Noire.—The petals and entire blossoms of althæa are often used; they impart a perceptible flavour to the wine, followed after several months by a disagreable taste, whilst the colour quickly separates. Aluminium acetate gives a distinctly bluish colour. Pasteur, Balard, and Wurtz, proposed pouring into 1 c.c. of the suspected wine, which has been diluted to a rose tint, four or five drops of a very dilute sodium aluminate solution; a violet colour is then obtained, which, however, also results from wine coloured with elder, danewort, or whortleberry. These adulterations are distinguished by putting into 1 or 2 c.c. of the wine a small crystal of ferrous sulphate, and adding several drops of an aqueous solution of bromine; pure wine becomes yellowish; if it is adulterated with "mauve noire," the colour becomes bright violet; elder becomes intense blue, and danewort becomes dull yellow. On dissolving a crystal of iron alum in infusion of the "mauve" of elder and of danewort, the "mauve" becomes yellow without precipitating; the elder precipitates, and the liquid becomes green; with whortle and danewort a deposit also forms, but the coloration is brown; with pure wine also a precipitate forms, but the colour of the liquid is less brown than in the preceding case. These last methods of distinction are insufficient, but further means are described below.

Red Beet.—The beet is generally employed only for masking certain mixtures, since by itself it loses much of its colour during fermentation, and quickly passes to red or brown. If fresh it becomes lilac with solution of sodium bicarbonate charged with carbonic acid; and changes to yellow, with alkalies, if old.

Elder, or Danewort, Berries.—These berries are used to colour light white wines; the danewort always imparts a faint disagreeable turpentine smell. In Spain and Portugal these berries are used to give a peculiar colour and taste to sweet and very alcoholic wines. The *teuite de Fismes* is made by digesting elder berries in alum solution, and submitting them to pressure. As much as 4 to 7 grams of alum per litre have been found in wine thus adulterated; and alum should always be looked for if the above colouring substances are found. Wines coloured with the berries give a deep blue-violet lake with alum and sodium carbonate. This test is very characteristic, es-

pecially if made comparatively with the pure wine. The ammonia, sodium aluminate, and sodium acetate reactions are not recommended. If a piece of flannel or silk be mordanted with aluminium acetate, and be heated with 20 grams of wine until this is almost evaporated, and the flannel or silk be then washed and placed in some water containing a few drops of ammonia, its colour changes to green if it has been in pure wine; to deep brown if in wine coloured with elder, and probably also if coloured with danewort.

Privet Berries.—Privet is little used for colouring wine in France. Its violet-red colour fades gradually, especially if the berry has fermented, and then imparts only a much less rich red colour. If present in wine, its colour becomes blue or green by alkalies and alkali carbonates; green or grey by bicarbonates; but borax does not change its colour.

Whortleberries.—This colouring matter is scarcely met with in French wines. In the table (*loc. cit., Chem. Soc. Journ.*, 1876, ii., 438) the principal characteristics of this colouring matter are given. Citric acid should always be looked for if whortleberry colouring is suspected, and its detection is one of the best proofs of this adulteration.

Indigo.—Reaction (A.c.) and (B.b.) in the table (*loc. cit.*) is sufficiently sensitive to indicate indigo by itself; the smallest traces can be found. 50 c.c. of the wine are usually sufficient for the experiment. A piece of silk or wool mordanted with aluminium acetate, and heated nearly to dryness, with 20 to 40 c.c. of the wine, washed, and soaked in dilute ammonia, becomes dull green if the wine is pure, and blue if it contained any indigo sulphate. The formation of chloraniline as a test for indigo is of theoretical rather than practical value. Such indigo is often added only to tone down bright colours, as fuchsine and cochineal. Other colouring matters should always be looked for in the wine after removing the indigo in the fining. Indigo disappears very rapidly in wines artificially coloured; hence when the wine itself is found free from indigo, the lees, after having been washed with water, often give, when boiled with alcohol, the coloration characteristic of indigo.

Comparative Merits of the various Methods for the Detection of Fuchsine. (*Zeitschr. des oesterr. Apoth. Ver.*, 1877, 436. From *Journ. de Pharm. et de Chim.*, January, 1878, 14.) A committee, consisting of the chemists Latour, Yvon, Wurtz, and Marty, have investigated the merits of the various methods proposed for detecting fuchsine in wine, and have made a report, of which the following is an abstract.

All the methods may be comprised in two classes :—

1. Direct extraction of the fuchsine by means of a menstruum which is insoluble in the wine, namely, amylic acid. Roméi's method.

2. Previous decomposition of the fuchsine by means of an alkali (ammonia or baryta); solution and extraction of rosanaline (the base of fuchsine) by an appropriate menstruum (carbon disulphide, acetic ether, benzin, chloroform); precipitation of the colouring matter upon a nitrogenized fibre, by moistening the latter, previously saturated with the rosaniline, with acetic acid. Falière's method, modified by Jacquemin, Ritter, Bouillon, Girard, and Fordos.

Roméi's method is to be recommended as a preliminary test. It is easily applied, and is perfectly reliable if it gives a negative result. If the amylic alcohol appears coloured, however, it may possibly contain fuchsine, orseille, or rosolic acid.

To avoid mistakes, it is necessary to add to 5 c.c. of the wine 10 c.c. of solution of basic acetate of lead, sp. gr. 1·320, to heat the mixture (not to boiling), to filter, and to add to the nearly cooled filtrate 10 drops of acetic acid and 10 c.c. of amylic alcohol. After briskly shaking, and allowing to separate, the amylic alcohol appears colourless if the wine was pure; rose or cherry red, if fuchsine is present; yellow, if rosolic acid is present; rose red or violet, if the wine contains orseille. The coloured amylic alcohol is separated, mixed with an equal volume of weak ammonia solution, and shaken. The amylic alcohol loses its colour under all circumstances. Then if the ammoniacal layer remains colourless, the original colouring agent was fuchsine; but if the ammoniacal layer appears reddish violet, this indicates rosolic acid; if bluish white, orseille had been present.

Falière's method is chiefly valuable in medico-legal examinations. It is based on the fact that wool or silk which have been coloured by fuchsine lose their colour by ammonia, and resume it by acetic acid. A wine containing fuchsine or rosolic acid may be deprived of them by shaking with ether, under addition of acetic acid. On now pouring the ethereal solution into weak ammonia water, and shaking, the fuchsine base, namely, rosaniline, remains colourless in the solution, while rosolic acid is converted into ammonium rosolate and colours the solution reddish violet.

Fuchsine does not remain permanently in wine; it combines with œnoline, and is deposited as a sort of resin upon the sides of the vessel. In such cases the sediment should also be examined.

Note on Geranium Oil. Prof. G. Dragendorff. (*Pharm.*

Journ., 3rd series, viii., 564.) The author received from Mr. H. W. Langbeck an authentic specimen of geranium oil, derived from a species of *Andropogon*, which did not correspond with the reactions of either the Turkish or French oil mentioned by him (the author) in his report on the identification of essential oils (*Year-Book of Pharmacy*, 1876, 291–303). The oil in question is perfectly colourless, and has an agreeable geranium odour; it decolorizes bromochloroform, and does not acquire with it any colour, even after standing some time. With chloral it forms an almost colourless mixture. In alcoholic hydrochloric acid it dissolves equally colourless, but becomes very slowly reddish, and subsequently of a turbid red-brown colour. The oil is dissolved by concentrated sulphuric acid with a dark gamboge colour, but with it, as well as with Fröhde's reagent, it soon assumes a brown colour. A mixture of alcoholic hydrochloric acid and chloral forms, as pointed out by Mr. Langbeck, a rose coloured solution.

The difference between the results obtained in his former experiments and the present leads Prof. Dragendorff to think that either both of the oils formerly examined by him were actually prepared from the rose geranium, or from a species of *Andropogon* different from that from which the oil of Mr. Langbeck was obtained.

Cyclamin, Primulin, and Primula-Camphor. L. Mutschler. (*Liebig's Annalen*, clxxxv., 214–223; *Journ. Chem. Soc.*, 1877, 903.) The author has examined cyclamin extracted from cyclamen bulbs by 70 per cent. alcohol. After treatment with animal charcoal, it forms a dazzling white powder, or white granules made up of microscopic needles. It is very hygroscopic, easily soluble in weak spirit, and more or less soluble in methyl and amyl alcohols, ethyl acetate, and glycerin; insoluble in ether, chloroform, carbon bisulphide, benzene, and petroleum spirit. Cyclamin is inodorous, but has an extremely acrid and bitter taste; and its dust excites violent sneezing. It turns brown at 100° and melts at 236°. The aqueous solution is opalescent, froths like soap water, and produces a white precipitate in alkaline solution of cupric oxide, but does not reduce copper, even on long boiling. Strong sulphuric acid dissolves cyclamin with red colour; on diluting the solution with water, the colour disappears, and a white precipitate of cyclamiretin is thrown down, glucose remaining in solution. This decomposition of cyclamin into cyclamiretin and sugar is effected also by heating its aqueous solution to 95° for some time; by heating the dry substance to 100°; by prolonged exposure of the solution to direct

sunshine; by the action of emulsin or beer yeast; but most easily and completely by the action of dilute hydrochloric acid.

Cyclamin closely resembles saponin in physical and chemical characters, and is probably identical with it.

Cyclamiretin is a white, amorphous, inodorous, and tasteless powder, dissolving in alcohol and ether, but not in water, and melting at 198°. It is coloured violet by sulphuric acid. Its composition agrees with the formula $C_{15}H_{22}O_2$. By fusion with potash it yields formic and butyric acids and other products. Nitric acid acting upon it produces resinous bodies, and ultimately oxalic acid.

Primulin.—The substance extracted from primula roots by alcohol, and thus named by Hünefeld, is found by the author to be nothing but cyclamin.

Primula-Camphor.—This substance, obtained by the distillation of primula roots, separates from the distillate, after standing, either in shining hexagonal laminæ, or in the form of a semi-solid, oily mass. It smells like fennel or anise; tastes at first burning, afterwards sweet; melts at 49°, and distils above 200° without decomposition. The camphor dissolves sparingly in water, but easily in alcohol and ether; the aqueous solution is coloured violet by ferric chloride. Its composition agrees with the formula $C_{22}H_{24}O_{10}$. It yields salicylic acid by boiling with potash ley.

Iodides and Iodates. W. Stevenson. (*Chem. News*, 1877, 201.) The following process is recommended for preparing iodic acid, hydriodic acid, and most iodides and iodates :—

Dissolve 2 parts of barium hydrate in 4 parts of boiling water; add gradually 3 parts of iodine, and filter when the solution is neutral and colourless. The reaction is as follows,—

$$6\,Ba\,H_2O_2 + 6\,I_2 = Ba\,2\,I\,O_3 + {}_5Ba\,I_2.$$

The precipitated barium iodate may be used for making iodic acid by decomposition with sulphuric acid, filtering, and evaporating the filtrate to crystallization *in vacuo*. By substituting an equivalent of any soluble sulphate, the iodate may be readily formed, thus :—

$$Ba\,2\,IO_3 + (N\,H_4)_2\,S\,O_4 = Ba\,S\,O_4 + 2\,N\,H_4\,I\,O_3.$$

The same applies to the filtrate containing the iodide of barium, which may be employed for preparing hydriodic acid by adding sulphuric acid till no further precipitate occurs; or by decomposing with any soluble sulphate the corresponding iodide may be made :—

$$Ba\,I_2 + Mg\,S\,O_4 = Ba\,S\,O_4 + Mg\,I_2.$$

Iodide of Starch. W. Bondonneau. (*Journ. de Pharm. et de Chim.*, 1878, 121.) Iodide of starch is a definite compound, its composition being represented by the formula $(C_6 H_{10} O_5)_{10} I_2$. It is obtained in a pure state by diffusing starch in from fifteen to twenty times its weight of water, treating the mixture with sufficient sodium hydrate to dissolve the starch, then acidifying the solution with hydrochloric acid and adding iodine in moderate excess. The iodide of starch thus precipitated is washed with water, acidulated with hydrochloric acid, and then dried at an ordinary temperature. It forms hard violet black pieces with a coppery lustre, which when diffused in water swell out and impart to it a deep blue colour. At 100° C. it loses from 16 to 18 per cent. ($H_2 O$ and H I), becomes carbonized and is not decolorized by sulphite of sodium; the loss is increased to 46 per cent. by heating to 190° C. (374° F.), and the black residue then contains 2 to 3 per cent. of iodine. When heated with water, in a sealed tube, it is gradually almost completely converted into glucose and hydriodic acid. A similar conversion, including dextrine and an iodated organic compound, is produced by diastase and by saliva. The iodine is dissolved by alcohol, but not by potassium iodide, benzine, sulphide of carbon, or other solvents. Iodide of starch contains 13 per cent. of iodine, a portion of which is slowly eliminated by drying over sulphuric acid.

Preparation of Phosphorus Acid. J. Corne. (*Journ. de Pharm. et de Chim.*, 1878, 100.) Phosphorus is kept partly immersed in distilled water in an open vessel for several days, the phosphoric acid formed after that time, precipitated by magnesium sulphate and ammonium hydrate in the presence of ammonium chloride, the filtrate boiled to expel the ammonia, and then mixed with lead acetate, which will cause a precipitation of lead phosphite, sulphate, and chloride. The precipitate after being well washed is digested with a warm solution of ammonium acetate, which removes the sulphate and chloride, leaving the phosphite undissolved. The latter is washed, and decomposed with sulphuretted hydrogen, the solution filtered, and the $H_2 S$ expelled by boiling.

Preparation of the Yellow Oxide of Mercury. J. B. Gille. (*Répert. de Pharm.*, 1877, No. 14.) The author prefers lime water as a precipitant to either of the fixed alkalies, because the latter invariably contain some carbonate, and thus cause a contamination of the product with mercuric carbonate. The lime water should be used in considerable excess, and the precipitate, decanted and filtered immediately to prevent formation of calcium carbonate.

Thus prepared the oxide has a paler yellow colour than that prepared by sodium or potassium hydrate.

Contamination of Oxalic Acid and Ammonium Oxalate with Sulphuric Acid. O. Binder. (*Zeitschr. für anal. Chem.*, xvi., 334.) The author calls attention to the frequent occurence of sulphuric acid in ammonium oxalate of commerce and in the oxalic acid from which the latter is prepared. The sulphuric acid is present in a free state, enclosed in the crystals, and also as acid sulphate. In commercial oxalic acid the impurity was found to the extent of ·4 per cent.

Rapid Preparation of Platinum Black. Prof. R. Böttger. (*Pharm. Centralhalle*, 1877, 218.) A highly active platinum black may be readily prepared as follows:—Solution of platinum perchloride is slowly heated with a moderate quantity of sodium potassio tartrate, and the platinum black which is thus precipitated is at once collected on a filter, washed, and dried at an ordinary temperature. The precipitation is accompanied with an evolution of carbonic acid gas.

Analysis of Indigo. V. Tantin. (*Chem. News*, from *Moniteur Scientifique Quesneville*, November, 1877.) The author points out the inaccuracy of all the volumetric processes depending upon the action of an oxidizing agent upon indigotin, inasmuch as gluten, indigo-brown and indigo-red enter also into the reaction. The method of Houton Labillardière he considers in itself exact, but the colorimeter of this chemist is not trustworthy within 10 per cent. In its place he recommends an improved colorimeter by J. Salleron, which he figures and describes, and which enables very slight differences in the intensity of two shades of colour to be distinctly recognised. His method of operation is as follows:—

1. *Taking the Specimen.*—About 5 grams are scraped with a knife from the merchant's sample. If the latter is composed of several pieces, a quantity is scraped off each proportionate to its weight.

2. *Pulverization and Sifting.*—The 5 grams of indigo taken for analysis are ground in an iron mortar and passed through a sieve of silk having 100 meshes to the square centimetre. The pulverization and sifting should be continued till nothing remains; for if the harder fragments less easily ground are rejected, the process cannot show the real value of the indigo.

3. *Weighing.*—0·30 gram of each indigo under examination is then weighed out in a balance sensitive to half a milligram.

4. *Selection of a Standard.*—The author uses *pure indigotin*, which

may be obtained by collecting the scum which forms constantly upon the surface of the indigo vats, and treating it with hydrochloric acid diluted with water in order to remove all foreign matter. The residue from this operation, very carefully washed upon a filter and dried, is preserved in bottles with ground-glass stoppers. The comparison of the samples with this standard demands much attention. It should be used merely to determine the value of some indigo which may in turn serve as a standard for other samples.

5. *Solution of the Indigos in Sulphuric Acid.*—The 0·30 gram of each sample and of the standard is introduced into flasks of a peculiar form, known as assay flasks. To each must be added 10 grams of pounded glass, previously washed and perfectly dried, and into each flask is poured by means of a pipette 5 c.c. of sulphuric acid chemically pure. The author attaches great importance to the use of this acid in preference to that of Nordhausen, which gives purple solutions in which the eye with difficulty recognises slight variations of intensity. The flasks are heated in a water bath to a temperature of 60° to 70°, taking care to agitate every half-hour. After the lapse of four hours, the solution of the indigotin being complete, the product in each case is diluted with water and made up to 3 litres. For the sake of exactness this dilution is carried on in a narrow-necked flask which holds 3 litres up to a mark on the neck. The liquid is then allowed to settle for half an hour before transferring into the colorimeter.

6. *Comparison of the Intensity of the Solutions in the Colorimeter.*—10 c.c. of the solution under examination are poured into the right-hand tube of the colorimeter, and the same measure of the standard solution into the left-hand tube. The latter will ordinarily be the deeper (invariably if pure indigotin is taken for a standard). By means of the burette attached to the instrument, a few drops of water are poured into the left-hand tube, and by means of the caoutchouc tube, air is gently blown in, so as to mix thoroughly the coloured solution and the water added. If the two liquids have not yet exactly the same shade, more water is added by small portions, blowing in air each time till perfect equality is reached. The number of c.c. of water used is then read off, and the value of the indigo under examination will be inversely as the figures obtained.

To have results absolutely exact we ought to compare only indigos from the same locality, for it is very evident that for equal percentages of indigotin, a Bengal indigo should have a superior value to one from Java or Guatemala.

Action of Tartaric Acid on Calcium Carbonate. B. J. Grosjean.

(*Chem. News*, xxxv., 190.) The author's experiments show that calcium carbonate is more soluble in a weak solution of tartaric acid than in a strong solution containing the same weight of the solvent. On treating both precipitated chalk and whiting with 20 parts of boiling watar containing 4 parts of tartaric acid, neither carbonate was dissolved, even when the acid was doubled and concentrated into syrup. But addition of water caused solution of the salt. If, however, the carbonate is treated with 20 parts of water *saturated* with tartaric acid, solution is brought about by heating, even without dilution.

Calcium Phosphate E. Hirschsohn. (*Pharmaceutische Zeitung für Russland*, 1877, No. 10.) The author has made extended researches as to the best method of preparing medicinal calcium phosphate which would be (1) crystalline; (2) of uniform and constant composition; (3) easily soluble in dilute acids, especially in the stomach; and (4) the largest possible quantity which could be obtained from the materials employed. His final results are as follows:—The salt should be prepared by double decomposition of calcium chloride in excess by sodium phosphate, so that only about one half of the calcium chloride is decomposed. 100 parts of anhydrous calcium chloride are dissolved in 400 parts of water and 187 parts of sodium phosphate ($Na_2 H P O_4, 12 H_2 O$) in 5610 parts of water, and the latter solution added, not too slowly, to the former, at ordinary temperature; the precipitate is immediately transferred to a filter, washed and dried at 30°–40° C. The product is a very light powder of the composition $Ca H P O_4, 12 H_2 O$.

Decomposition of Oil of Turpentine by Heat. G. Schultz. (*Ber der deutsch. chem.-Ges.*, x., 113.) The vapour of oil of turpentine, when slowly passed through a red-hot iron tube, yields in addition to a mixture of incombustible gases (not examined), a black tar consisting of benzol, *toluol*, xylol, naphthaline, phenantherene, anthracene, methylanthracene, and undecomposed oil of turpentine.

Detection of Tartaric Acid as an Adulterant of Citric Acid. M. Cailletet. (*Répert. de Pharm.*, 1877, 502.) The process suggested by the author is based upon the fact that a cold solution of potassium bichromate rapidly blackens tartaric acid, with a simultaneous evolution of carbonic acid gas; whereas its action on citric acid is very slow, and merely produces a brown coloration. About 10 c.c. of a cold saturated solution of the bichromate are placed in a test tube and then mixed with 1 gram of the acid to be tested, the mixture being well stirred with a glass rod for a short time. If the

acid was pure, the mixture, after being allowed to stand for ten minutes, will be orange-red, or pale brownish red; but in the presence of 1 per cent. of tartaric acid, it will appear deep brown, and in that of 5 per cent. of the adulterant, brownish black.

Compounds of Salicylic Acid with the Albuminoids. F. Farsky. (*Chem. Central.*, 1877, 148; *Journ. Chem. Soc.*, March, 1878.) The author has prepared compounds of egg-albumen, casein, fibrin, and santonin with salicylic acid by several methods. Either the albuminoid and the acid were mixed together and allowed to stand with constant stirring, or the two were combined in a dialyser, or the vapour of the acid was made to act on the finely powdered substance. Whichever method of preparation was adopted, the solid substance was finally extracted by pure ether, which was shaken up with it as long as the filtrate gave a reaction with ferric salts. The albumen compound was then washed with hot water, and dried in an air bath at 120°–130°.

Analyses showed that on the average 14·16 per cent. of salicylic acid was combined with 85·84 per cent. of the albuminoid, which points to the formula $C_{72}H_{112}N_{18}SO_{22} + 2C_7H_6O_3$. These compounds are found to be quite as easily digestible as the uncombined albuminoids, so that salicylic acid might possibly be used for the preservation of feeding stuffs.

In connection with the above researches, the author has been enabled to make a more accurate investigation of salicylic acid, and he gives the following account of it. It crystallizes from concentrated solutions in slender, almost colourless needles, from dilute solutions in larger prismatic, very hard crystals, often very prettily grouped. If, however, other bodies are present in the solution, and more especially if they are organic bodies, regular crystals are not formed; but, according to the nature and quantity of the admixed body, either crescent shaped, annular, or tufted forms which scarcely resemble crystals, are obtained.

When the foreign body is removed, the acid gradually regains the capability of forming acicular crystals. Freezing the solution also brings about the change. The acid melts at 157·5°, and sublimes at 200°, but even at 80° a considerable quantity volatilizes. Perfectly pure crystals may be obtained by heating a solid body containing the acid, or a solution of the acid, at this temperature, in the air or water bath. The acid, as is well known, splits up on boiling into carbon dioxide and phenyl-alcohol; but it is quite sufficient to heat the solution of the acid or certain salts, especially in presence of other acids, for a long time on the water bath, to

bring about this change. Hydrated sulphuric acid decomposes salicylic acid only when it is added all at once to the solid acid or its solution.

Permanganate of potassium, especially in presence of sulphuric acid, oxidizes salicylic acid, and among other products of the decomposition are found formic and carbonic acids and water. A similar decomposition is effected by boiling the acid with potassium bichromate and sulphuric acid. If the solution of the acid is heated with the bichromate without addition of sulphuric acid, a body passes over with the steam which has an unpleasant odour; it has not been examined. When salicylic acid is brought into contact with ferric acetate, it combines with the iron, the liquid becomes of a violet colour, and deposits a dirty violet precipitate of $Fe_2 H_2 O_4$.

This hydrate dissolves in water and forms a golden yellow liquid, which can be concentrated, but is decomposed by contact with acids, bases, salts, alcohol, ether, and even filter-paper, and rendered insoluble. If, however, the solution of the ferric salt is tolerably concentrated, and especially if the mixed solution is not too acid, a brown salicylate separates out. The acid behaves in a similar way to lead acetate; lead salicylate is formed, and very strong vapours of acetic acid are evolved in the cold.

Salicylic acid forms three salts with ferric oxide: a normal salt, a basic salt, and a so-called ferric ferro-salicylate.

The Preparation of Mercurous Iodide. M. Le Canu. (*Répert. de Pharm.*, 1877, 139–141.) The process recommended by the author for the preparation of the green iodide of mercury is as follows:—Five grams of mercury are triturated with about twenty drops of alcohol until the mercury is finely divided. A few drops of alcohol are added during this process, to replace that lost by evaporation. Three grams of iodine are now added, in small portions, and the whole triturated as rapidly as possible. The finely divided mercury rapidly combines with the iodine, any biniodide formed is almost instantly reduced, and at the end of ten to twenty minutes a very pure mercurous iodide is obtained without the necessity of washing with alcohol.

Mercurous Iodide. M. Schlagdenhauffen. (*Pharm. d'Alsace 'Lor.*, 173–176. From *Amer. Journ. Pharm.*) The author has examined the various processes recommended for preparing this compound, and arrived at the conclusion that, even after prolonged trituration of mercury and iodine in the proper proportion, there results a mixture of metallic mercury and mercurous-mercuric iodide. If prepared by double decomposition of mercurous salt

(nitrate) and potassium iodide, a mixture results of variable proportions of the same constituents, and if a sufficient excess of potassium iodide is employed, the yellow precipitate disappears with the formation of potassio-mercuric iodide, leaving metallic mercury behind.

The Preparation of Mercurous Iodide. M. Patrouilliard. (*Répert. de Pharm.*, 1877, 549.) In discussing the merits of the various formulæ for the preparation of this substance, the author draws attention to a process originally suggested by M. Dublanc, which he considers superior to those generally employed. 227 parts of red mercuric iodide are triturated with 100 parts of metallic mercury, a little alcohol being added from time to time to keep the mixture moist during the trituration. The reaction proceeds rapidly and yields a product of a greenish yellow colour and perfectly homogeneous appearance. By washing it with alcohol it can be readily freed from any trace of mercuric iodide it might possibly contain.

Direct Preparation of Soda and Potash from their Chlorides. E. Bohlig. (*New Remedies*, 1878, 4, from *Bayerisches Industrie und Gewerbe Blatt.*) The author prepares the carbonates of sodium and potassium directly from their chlorides by the intervention of magnesium oxalate, which is always reproduced again in the process.

1. Magnesium oxalate (freshly prepared when newly starting, but after the first operation obtained as a by-product in the next step) is allowed to drain, and then mixed in a large vat with the proper quantities of sodium chloride or concentrated brine and hydrochloric acid, after which it is allowed to stand a few hours. Decomposition takes place almost instantaneously; all the magnesium goes into solution in form of syrupy magnesium chloride, while all the sodium and the oxalic acid are deposited as a crystalline acid salt (acid sodium oxalate, or binoxalate of sodium). Since the magnesium oxalate is always obtained of the same composition and in the same quantity, it is sufficient to determine its weight once for all, and to take each time the previously calculated amounts of common salt. The acid need not be weighed either: it must be added in just sufficient quantity to destroy the milky appearance which the mixture first assumes. The reaction is as follows:—

$$\underset{\text{magnesium oxalate}}{Mg\,C_2O_4} + \underset{\text{hydrochloric acid}}{H\,Cl} + \underset{\text{sodium chloride}}{Na\,Cl} = \underset{\text{sodium binoxalate}}{Na\,H\,C_2O_4} + \underset{\text{magnesium chloride.}}{Mg\,Cl_2}$$

The crystalline powder of sodium binoxalate is transferred to

large draining filters, washed with water until the acid solution of magnesium chloride is removed, and worked up, as below described, while still moist. The acid solution of magnesium chloride is made use of several times in succession, as so much hydrochloric acid, together with a quantity of fresh acid sufficient for the reaction. Finally, when the magnesium chloride has inconveniently accumulated, it is worked up by itself into magnesia and hydrochloric acid.

2. In order to obtain the soda the sodium binoxalate is brought together with an equivalent quantity of magnesium carbonate and water in a tight cask. As soon as the remaining air has been nearly expelled by the generated carbonic acid gas, the cask is closed and a stirring mechanism is set in motion. A pressure gauge attached to the cask indicates a gradual rise of the pressure to two atmospheres, but on continued stirring this diminishes until finally the gauge stands again at 0°. The cask now contains a concentrated solution of sodium bicarbonate and a precipitate of magnesium oxalate, which latter, being coarsely granular, is easily separated from the liquid, and is used over again, after washing, for a new operation. The solution of sodium bicarbonate is boiled for a short time with magnesia, obtained in distilling magnesium chloride, and both are thereby converted into simple carbonates. Both reactions are shown in the following scheme :—

1. $NaHC_2O_4 + MgCO_3 = NaHCO_3 + MgC_2O_4$
   Sodium binoxalate + Magnesium carbonate = Sodium bicarbonate + Magnesium oxalate.

2. $2NaHCO_3 + MgO = Na_2CO_3 + MgCO_3 + H_2O$
   Sodium bicarbonate + Magnesia = Sodium carbonate + Magnesium carbonate + Water.

As the solution of sodium carbonate, after concentration to 40° B., is incapable of dissolving or retaining in solution any sodium oxalate, it follows that the whole of the oxalic acid is recovered. The magnesia which is required for the process is obtained by distilling magnesium chloride, which thereby splits up into hydrochloric acid and magnesia. One half of the latter receives, as we have seen, its carbonic acid by boiling with sodium bicarbonate; the other half is placed, while still moist, upon trays in great wooden closets, through which the gases of the furnace pass, and is thereby carbonated. The process may also be so modified that the sodium binoxalate is first decomposed by caustic magnesia, and that magnesium carbonate is afterwards added. The whole mixture is then transferred to a stirring cask, provided with openings for the

passage of cooled furnace-gases, whereby the caustic soda present is very soon carbonated.

3. As soon as a large quantity of magnesium chloride solution has accumulated, it is tested as follows:—A small sample is mixed, while boiling, with magnesium oxalate, as long as the latter is dissolved, and then allowed to cool. There should be no crystalline deposit of sodium binoxalate formed, a proof that the solution does not contain any sodium chloride in excess, and is fit for distillation. It is first neutralized by adding some more magnesia, and evaporated over a naked fire in large kettles to a doughy consistence, short of driving off any hydrochloric acid. It is then transferred into the ordinary soda-furnace, where it is distilled with a moderate fire. The eliminated hydrochloric acid is condensed in the usual manner. The residuary mass should not be heated red hot, so as not to impair its porosity or its ready affinity for carbonic acid. If, however, the first-mentioned test shows the magnesium chloride to contain sodium chloride, the whole mass must be mixed with magnesium oxalate, and, after removal of the precipitated sodium oxalate, saturated with magnesia and distilled.

The same process, in all its details, may also be employed for the manufacture of potassa and its carbonate.

New Test for Potassium. A. Carnot. (*Pharmaceut. Centralhalle*, 1878, No. 5.) The test solution is made by dissolving 1 part subnitrate of bismuth with the aid of the smallest required quantity of hydrochloric acid; add to this a strong aqueous solution of 2 parts of hyposulphite of sodium, and then a large excess of alcohol. This reagent forms a yellow precipitate with solutions of all potassium salts, and does not affect sodium combinations. Barium and strontium give the same reaction, but as they belong to a different analytical group, they can be easily separated before the test is applied. The test may also be applied for the quantitative estimation of potassium.

Volumetric Estimation of Potassium. A. Carnot. (*Comptes Rendus*, lxxxvi., 478–481.) The author has described a test for potassium which depends on the precipitation from an alcoholic solution of a double hyposulphite of potassium and bismuth. (See the preceding article.) On this he now bases a volumetric process, which consists in the determination of the hyposulphurous acid in an aqueous solution of this double hyposulphite by means of a titrated solution of iodine. On adding the iodine solution to a cold neutral solution of the double hyposulphite, a red precipitate of bismuth oxyiodide is formed, which can be prevented

by acidifying with hydrochloric acid, which, in the short time required for the reaction, does not act on the hyposulphite. When the iodine is added, the greenish solution changes to a light golden yellow; towards the end of the operation, however, each drop produces a brownish tinge which disappears on agitation. The end of the operation is shown by a single drop producing a permanent change from light yellow to dark brown. This change can be clearly perceived either in natural or artificial light. Two equivalents of hyposulphurous acid correspond to one equivalent of potash or of iodine. Details of the preparation of the standard solutions are given, and also the precautions necessary to be observed in conducting the analytical operations.

Milk Analysis. H. Ritthausen. (*Journ. Chem. Soc.*, from *Journ. prakt. Chem.*, 1877 [2], xv., 329.) The author dilutes 10 or 20 c.c. of milk to 20 times their volume, and adds 5 or 10 c.c. of solution of sulphate of copper (63·5 grams of sulphate in 1 litre). As much potash is then added as is sufficient to decompose the copper sulphate. The precipitate soon settles, the supernatant liquid is decanted off, and the washed precipitate is placed on a filter. The filtrate contains the sugar, which can be estimated. The precipitate contains the proteid and the fat. This latter can be dissolved out by ether, after washing with absolute alcohol, the ether evaporated, and the fat weighed. The precipitate is again washed with absolute alcohol, dried over sulphuric acid, and then at 125° for two or three hours, and weighed. The dry powder product is then well ignited, the loss giving the quantity of proteid. Schmen, of Munich, uses an earthenware plate, which he heats to 100°, and then allows to cool, quickly rinses it with a little water, and then places it over a glass vessel containing some concentrated sulphuric acid. The milk, which is diluted with an equal bulk of distilled water, and contained in a kind of wash bottle (spritz-glas), is then poured over the centre of this earthenware plate, and, to prevent evaporation, covered with a ground clock glass. 9 to 10 grams of milk are sufficient. After one or two hours the serum is absorbed by the plate, and the casein and fat can be scraped off with a horn spatula, and then placed in a weighed watch glass. This is heated to 105° in an air bath and weighed. The fat can be dissolved out by ether and estimated.

Milk Analysis. C. Christenn. (From *Landw. Versuchs-Stad.*, xx., 439–455.) 10 grams of milk are well agitated with 10 c.c. of ether and 20 c.c. of alcohol; the precipitated albuminoids are collected on a weighed filter, and washed with a mixture of 1 part

of ether and 2 of alcohol, until the filtrate, which is at first turbid, begins to run through clear. The precipitate, dried at 95° to 100°, gives the weight of albuminoids and insoluble salts; by ignition the weight of the latter is obtained. The filtrate evaporated to dryness gives the amount of fat, soluble salts, and milk sugar; the fat is extracted with ether, the residue weighed, and the fat determined by difference. The mixture of soluble salts and sugar is ignited, and the residue treated with hot water. The weight of soluble salts is obtained by evaporating the aqueous solution to dryness and igniting.

The Decomposition of Albuminoids in Milk. A. Wynter Blyth. (The *Analyst*, April, 1878.) The author attributes certain discrepancies in the analysis of milk made by different analysts to a decomposition of its albuminous constituents and a simultaneous production of fat. The same sample of milk analysed at different periods would thus yield different percentages of fat and also different amounts of caseine. The author quotes an old memoir of Blondeau in confirmation of his results. M. Blondeau showed that Roquefort cheese when kept undergoes certain changes which are initially attributed to mycoderms; these changes result in the production of fat, so that a sample of cheese, containing originally 1·85 per cent. of fat, showed after keeping two months as much as 32·30 per cent. of fat, with a corresponding diminution in the amount of caseine, viz., from 81·03 per cent. to 43·28 per cent.

The Estimation of Caseine in Milk. L. Manetti and G. Musso. (*Zeitschr. für analyt.-Chem.*, 1877, 402; *New Remedies*, November, 1877.) The authors propose a modified method for determining the caseine in milk, which in certain cases is easier of execution than other processes, and furnishes sufficiently accurate results, provided the amount of salts accompanying the caseine be separately determined by ignition and deducted. The method is as follows:—50 grams of the milk, which should have acquired the proper degree of acidity for making cheese, are weighed into a porcelain capsule, and the latter is placed on a water bath containing water heated to 50° to 60° C. (122° to 140° F.), and left there until the milk has acquired a temperature of 39° to 40° C. (102° to 104° F.). A few drops of the glycerin solution of rennet are then added, the mixture is stirred with the thermometer, and kept at a temperature of 35° to 40° C. (95° to 104° F.). A few minutes after coagulation has set in the mass is cut with a spatula, and the colour of the exuding serum is noticed. If the latter oozes out quickly, and has a citron yellow colour, the coagulation is complete; otherwise

it is necessary to wait until such is the case. The liquid is poured off upon a grey filter, which had better be placed in a hot filtering apparatus; lukewarm water is poured upon the mass, and the latter stirred to break it up, and the liquid also poured upon the filter. This is continued until the last water ceases to react with Fehling's solution. The filter is now drenched with a few c.c. of a mixture of ether and alcohol, 40 to 50 c.c. of absolute or concentrated alcohol are then poured upon the mass in the capsule, heated to boiling on the water bath (the capsule being covered with a glass plate), and the boiling alcohol is poured on the filter. This is repeated until no more fat is extracted. The particles of caseine have by this time assumed a horny condition. They are washed a few times with ether, which is also poured upon the filter; the latter is spread out upon a plate of glass, the particles of caseine adhering to it are transferred to a watch glass, to which is also added the portion remaining in the capsule. The watch glass with contents is then dried in an air bath at 115° C. (239° F.) and weighed. A weighed quantity of this is ignited in a crucible, the amount of ash calculated for the total quantity of caseine, and deducted. The remainder represents the correct weight of caseine.

Estimation of Sugar in Milk. R. Gscheidlen. (*Pflüger's Archiv für Physiologie*, xvi., 133; *Journ. Chem. Soc.*, 1878, 345.) When milk is boiled with caustic soda a red liquid is produced, and a yellowish white coagulum; by filtering this through asbestos and comparing it with a similarly prepared solution containing a known amount of milk sugar by the ordinary colorimetric process, a close approximation to the amount of sugar present is readily obtained. Soda solution of 20 per cent. is added to the milk in equal volume, and the whole boiled for two to three minutes in each case,—a longer time of boiling, six to ten minutes, gives a darker shade. Instead of colorimetric determinations, spectroscopic observations may be made by Kerordt's method, the extinction-coefficient being determined once for all with a standard sugar solution.

Haidlen's process consists in evaporating to dryness with gypsum, treating with ether, and dissolving out the sugar from the residue by means of 85 per cent. alcohol; when due correction is made for the salts dissolved out, this method gives results comparable with those obtained by the above processes, or by means of Fehling's solution after removal of albuminoids. On the other hand, the results obtained by the polarization method are more irregular, as are also those given by the method of Boudet and Boussingault, viz., use Fehling's solution without removal of albuminoids.

Human milk contains from 3·07 to 4·42 per cent. of sugar during periods of from 2 to 130 hours after birth (five cases examined). According to Brunner, upwards of 6 per cent. is formed at later periods. Simon found that less sugar is contained in human milk some time after the birth than just after; whilst Crusius found that cow's milk increases in sugar after calving, until a constant percentage is obtained.

Volumetric Estimation of Sulphuric Acid in Waters. Dr. P. Haubst. (*Chem. News*, Nov. 23rd, 1877, 227.) The process is divided into two operations:—Estimation of sulphuric acid existing as alkaline sulphate; then estimation of the whole sulphuric acid, the difference being that in combination with earthy metals.

Take 100 c.c. of the water (if sodic and potassic carbonates be present, neutralize with dilute hydrochloric acid); add a slight excess of baryta water; then pass in a current of carbonic gas, or mix it with water highly charged with this gas; let it boil for a few minutes, and filter. The precipitate is washed with boiling water till the washings are neutral to test paper; and the filtrate, which contains now the alkalies as carbonates, is titrated with centinormal oxalic or sulphuric acid.

The amount of acid consumed is exactly the same as that originally combined with potassium and sodium. Calcium and magnesium salts, having been precipitated as carbonates, cannot interfere with the process.

Simultaneously with the first operation the second part may be carried on. The same number of c.c. are taken, raised to boiling, and sodium carbonate added till the liquid remains distinctly alkaline. It is then, after some minutes' ebullition, passed through a small filter and well washed. All the sulphuric acid present is now in combination with potassium and sodium, calcium and magnesium salts having been converted into cabonates by the action of the sodium carbonate, and removed by filtration.

Determination of Acetic Acid in Vinegar. H. Vohl. (*Ber. der deutsch. chem.-Ges.*, Nov., 1877.) The author describes a simple apparatus for the determination of the acetic acid in vinegar, consisting of a flask provided with a $Ca\,Cl_2$ tube and closed by a caoutchouc stopper through which passes a glass rod terminating in a platinum hook and supporting a tube of sodium bicarbonate. The apparatus is weighed alone, the vinegar added, and after weighing, the bicarbonate is lowered into the liquid. The resultant $C\,O_2$, after being entirely removed by suction, is determined by the loss of weight and the acetic acid calculated therefrom.

Determination of Acetic Acid in Vinegar. (C. Jehn. (*Ber. der deutsch. chem.-Ges.*, Dec. 10, 1877.) The author's method, which is designed for rapid technical work, consists in introducing 10 c.c. of the vinegar into a flask containing an excess of sodium bicarbonate, from which the liberated CO_2 is conducted into a second flask filled with water. The volume of water expelled from this flask is collected in a cylinder which can be calibrated, so as to show the percentages at once.

Preparation of Alkaline Nitrites. (*Zeitschr. des oest. Apoth. Ver.*, 1877, 426.) The two processes generally employed for the manufacture of alkaline nitrites yield preparations which, in the majority of cases, are contaminated with arsenic. This impurity emanates either from the lead used in the one process, or from the nitrous acid gas in the second process,—this gas being generally evolved from nitric acid by means of arsenious anhydride. The method recommended in this paper is free from this objection, and consists in the reduction of nitrates by means of an alkaline sulphite, the two salts being fused together in a crucible in equivalent proportions. The nitrate and sulphite form nitrite and sulphate, thus:—

$$KNO_3 + K_2SO_3 = KNO_2 + K_2SO_4.$$

From the fused mass the nitrite is extracted by alcohol, which leaves the sulphate undissolved.

Relation between the Atomic Weights of the Elements. F. Waechter. (*Ber. der deutsch. chem.-Ges.*, 1878, No. 1. From *Chem. News*, 1878, 161.) The following table expresses the mutual relations of the various groups. The horizontal lines contain analagous elements of similar valence, whose equivalents increase approximately by sixteen units. In the vertical columns the elements rank according to their decreasing atomic weights, the valence in each case rising and falling in the series I., II., III., IV., III., II., I.

	a.	$a+16$.	$a+2\times16$.	$a+3\times16$.	$a+4\times16$.	$a+5\times16$.	$a+6\times16$.	$a+7\times16$.	$a+8\times16$.
Univalent .	Fl = 18·960	Cl = 35·457	—	—	Br = 79·952	—	—	I = 126·85	—
Bivalent .	O = 16·000	S = 31·978	—	—	Se 79·480	—	—	Te = 128·000	—
Trivalent .	N = 14·044	P 31·045	—	—	As = 74·915	—	—	Sb = 122·265	—
Quadrivalent	C 11·970	Si = 28·050	—	—	76	—	—	—	—
Trivalent .	Bo 10·800	Al 27·480	Y = 46·200	—		—	—	—	Di = 138·100
Bivalent .	Be = 9·300	Mg 24·380	Ca = 39·974	—		—	—	—	Ba = 137·166
Univalent .	Li = 7·022	Na = 23·043	K = 39·137	—		—	—	—	Cs = 133·036

This arrangement brings to light the following points:—

1. The affinity of the elements decreases from fluorine to silicon with the increasing atomic weight and valence; from silicon to cæsium it increases with the still rising atomic weight, but with the

falling valence. The two end members, fluorine and cæsium, have the strongest but opposite affinities; the remaining elements have feebler affinities the nearer they approach the middle of the series. If the strength of the affinity of an element in comparison with the affinity of another element is decided according to the manner in which decompositions take place (if, *e.g.*, potassium decomposes sodium chloride or sodium potassium chloride) the above proposition comprehends 6706 cases of decomposition. By means of experiments already made, however, and from analogy, it can only be maintained that 658 cases of decomposition occur in accordance with the above law, while 26 cases are contradictory. No data exist for the decision of the remaining 5922 theoretically possible cases of decomposition.

2. The arithmetical mean of the atomic weights of two elements of equally intense but opposite affinity is approximately 76. If the amount of heat appearing on a chemical combination is regarded as the measure of chemical affinity, according to proposition 2, the same amount of heat must be liberated when equal quantities of iodine and magnesium, or of tellurium and sodium, enter into combination.

3. The melting points and boiling points of the elements named in the table increase from fluorine to silicon with the increasing atomic weight and valence; from silicon to cæsium they decrease with increasing atomic weight and still falling valence. Of twenty-two melting points twenty agree with this proposition; while two, phosphorus and silicon, disagree. Out of ten boiling points nine agree.

4. The specific heats of the elements contained in the table, as far as known, decrease with the increasing atomic weight and valence.

5. The specific gravity of the elements in the table in the solid state is in corresponding atomic weights (those in the same perpendicular series), the greater, the higher is the valence.

6. The affinity of the negative non-metallic elements—fluorine and silicon—for the true metals decreases with the increasing atomic weight and valence.

A Crystalline Indifferent Resin from Gurjun Balsam. Prof. F. A. Flückiger. (*Pharm. Journ.*, 3rd series, viii., 725.) The author examined a crystalline preparation which had been sold to him as copaivic acid, but which had been prepared from gurjun balsam. It proved to be not gurjunic acid, as he had expected, but a resin of entirely neutral characters. Purified by recrystallization from

petroleum spirit, it was obtained in prismatic crystals, which melt at 126°–130°, and have a composition corresponding to the formula $C_{28} H_{46} O_2$. It forms no compounds with bases, or crystalline derivatives with acetic or nitric acid. By dry distillation this substance yields an oil which is unaffected by ferric chloride. It is dissolved by sulphuric acid with a reddish yellow colour, and is reprecipitated by water; it is unaltered by fusion with potassium hydrate. The crystals belong to the asymmetric system.

Separation of Arsenic from other Metals. P. de Clermont and M. Frommel. (*L'Union Pharmaceutique*, April, 1878, 104.) The authors' method is based upon the observation that the freshly precipitated sulphides of many metals suffer decomposition on prolonged boiling with a large quantity of water, the result being the evolution of sulphide of hydrogen, and the separation of metallic oxides Sulphide of arsenic is similarly decomposed; and as its oxides are soluble in water, this decomposition is suggested as a ready means of separating arsenic from other metals. The boiling should be conducted in a retort and continued until 500 to 600 c.c. of water have distilled over. The contents of the retort are then filtered and the arsenic determined in the usual manner. Not more than a few decigrams of the sulphide should be used for the operation.

The Amount of Water in dried Chloride of Gold. J. Thomsen. (*Ber. der deutsch. chem.-Ges.*, x., 1504.) The author finds that the crystals of chloride of gold, as used in the arts and in medicine, contain, when perfectly dry, four molecules of water, and not three as is stated in books. Its formula is $Au Cl_3$, $H Cl$, $4 H_2 O$.

A New Indicator in Alkalimetry. W. von Miller. (*Ber. der deutsch. chem.-Ges.*, 1878, No. 4. From *Chem. News.*) The indicator proposed is tropeolin, a new colouring matter discovered by O. Witt, and manufactured by Messrs. Williams, Thomas & Dower. The shade known as oo is characterised by its behaviour with concentrated sulphuric acid, which turns its aqueous solution from a yellow to a crimson red. According to the author this reaction is common to all the mineral acids, even dilute, and to certain organic acids, especially the oxalic. Hence this variety of tropeolin is a valuable indicator in alkalimetrical titration, as has been proved by a series of comparative experiments, with this colour and with litmus. The alkaline liquid to be titrated is mixed with an aqueous solution of tropeolin containing 0·05 per cent. of the colour, so that 2 c.c of tropeolin solution are added to 50 c.c. of the liquid to be analysed, and the acid is dropped in till the light yellow colour of the solution

changes suddenly to a yellowish red. The point cannot be overlooked, for the transformation of colour is too striking, and the addition of a further drop removes all doubt by converting the orange colour into a decided red. Tropeolin can be preserved either in the dry or the wet state, and has the decided advantage that it is not affected either by acid carbonates or free carbonic acid. Hence the alkaline carbonates can be titrated without the aid of heat. If tropeolin is used as an indicator, a normal solution of sodium carbonate may be used instead of one of a caustic alkali, which is difficult to preserve. Further, tincture of litmus is reddened not merely by free acids, but by neutral metallic salts, whilst the yellow solution of tropeolin is turned red only by free acids, solutions of metallic salts having no effect.

Phenol-pthalein as an Indicator of Alkalies and Acids. E. Luck. (*Zeitschr. für anal. Chem.*, xvi., 332, 333.) One part of phenol-pthalein in 100,000 parts of water is turned red by the least traces of alkali, and the coloration is destroyed by a minimum of acid. For practical purposes 1 part of phenol-pthalein is dissolved in 30 parts of alcohol. To about 80 to 100 c.c. of the solution to be titrated, 1 or 2 drops (no more) of the indicator are added. The smallest drop of a normal alkali or acid solution is more than sufficient to bring about the conversion of the neutral into the alkaline or acid reaction. The indicator is easily prepared by heating phenol with pthalic anhydride and sulphuric acid; is perfectly colourless in a dilute aqueous or acidulated solution, but assumes a deep purple colour on adding the slightest excess of alkali.

A New Qualitative Reaction for Boric Acid. M. W. Iles. (*Chem. News*, xxxvi., 204. From *Journ. Chem. Soc.*) On dipping a borax bead into glycerin and gently heating in the flame, the mass takes fire, burning first with a yellow, than with a deep green flame. With datolite, which contains no soda, the green flame was also visible, but the result was not as satisfactory as anticipated. In subsequent experiments the author, however, found that it was best first to calcine the mineral powder, and moisten with sulphuric acid, heat to expel the acid, then moisten the mass with glycerin and allow it to take fire. Thinking that the carbon exerted some action upon the borate, finely divided charcoal and a borax bead were tried, but they gave negative results. Glycerin and a carbonate of sodium bead gave simply a yellow flame. Various metallic bases in a sodium carbonate bead and glycerin also gave negative results with regard to flame. A bead of microcosmic salt and glycerin gave the light green phosphoric acid flame, but of less intensity than that

noticed when a potassium chlorate match is burned. A large number of borates were experimented upon in order to test the general applicability of this reaction, and in every case conclusive reactions were obtained, and in a number of borates the glycerin test for boric acid seemed far more delicate than any of the known methods for the detection of this acid.

After comparing his new test with the various tests in general use, the author concludes with an opinion on the chemistry of this reaction. Boric acid being known to form with alcohol volatile compounds (boric ethers) which burn with a green flame, and glycerin being a true triatomic alcohol, the following experiment was undertaken :—About 2 grams of pure crystallized boric acid and 7 c.c. glycerin (94 per cent.) were heated in a small beaker until the boric acid was all dissolved; the liquid was then introduced into a small glass retort and heated gently. A clear limpid liquid soon condensed on the upper side of the retort. This distillate, when examined, had a sweetish, mildly acid taste, gave a distinctly acid reaction with blue litmus, and showed a faint tinge of green when burned. As the operation proceeded, the liquid in the retort became slightly turbid, soon darkening in colour to a reddish brown, the distillate assuming the same tint. The second portion of the distillate had a pungent taste and an odour of acrolein, showing an acid reaction; and when heated on platinum foil burned with a beautiful green flame. This compound is undoubtedly, therefore, a boric ether, the composition of which has not yet been determined.

The Action of Glycerin on Borax. Dr. A. Senier and A. J. G. Lowe. (*Pharm. Journ.*, 3rd series, viii., 819.) To a solution of borax in water a few drops of tincture of litmus were added, colouring the solution deep blue. The addition of glycerin to this solution caused it to change from blue to red, the characteristic wine red of free boracic acid. An experiment was then tried, using sodium monoborate in place of ordinary borax or biborate; in this case no red colour was developed. The ordinary acid borates of silver, mercuric-mercury, lead, barium and calcium, were next employed. In each of these cases the red colour or acidity was developed in the same manner as when borax was employed. Water seems to act in a manner opposed to glycerin, for when added in excess to the acid solution the blue colour returns. It is said that a large excess of water renders even an aqueous solution of borax more alkaline to litmus. It is well known also that solution of sodium carbonate is decomposed by boiling with aqueous solution of borax. In this case carbon dioxide is evolved, and a

more basic borate is produced. In like manner sodium bicarbonate or carbonate, or even calcium carbonate, is decomposed by solution of borax in glycerin, and there can be little doubt that the reaction is the same; that is to say, that the glycerin splits up the biborate into free boracic acid and a more basic borate. This more basic borate is probably not strongly alkaline in glycerin; at least, experiments show that while a glycerin solution of sodium biborate is acid, one of sodium monoborate is alkaline.

The authors also endeavoured to ascertain the amount of carbon dioxide evolved when carbonate of sodium is added to a solution of borax in glycerin. In these experiments the glycerin, borax, and sodium carbonate—all free from notable impurities—were employed in the anhydrous state, it having been ascertained that water lessened the evolution of gas. At 100° C. part of the carbon dioxide is evolved, but the greater part passes off at a somewhat higher temperature. Using concentrated solutions, carbonic dioxide is evolved in the proportion of half an equivalent to one equivalent of sodium biborate. From dilute solutions less CO_2 is obtained. These experiments show that at least in concentrated solutions a sodium borate midway between biborate and monoborate would answer the requirements of the free acid, doubtless boracic, which exists in glyceroles of borax. Very many experiments, not here detailed, were conducted with the view of separating the free acid, either directly or indirectly, all of which gave negative results.

The Flame Test for Boracic Acid. W. B. Mason. (*Pharm. Journ.*, 3rd series, viii., 820.) The author has made experimental comparisons of the various modes of applying the flame test for borates, viz.:—

1. By the use of sulphuric acid and spirit.
2. By fusing with bisulphate of potassium and fluoride of calcium.
3. By heating with glycerin.
4. By heating with sulphuric acid or other acids.

He comes to the conclusion that the use of strong sulphuric acid in the blowpipe or Bunsen flame is the best of these tests.

A Reaction of Citric Acid. A. Sabanin and N. Laskowsky. (*Zeitschr. für anal. Chem.*, xvii., 73–76.) On heating in a small tube, closed by fusion as near the surface of the liquid contents as possible, a mixture of not less than 10 milligrams of citric acid in strong solution, with 2 to 3 c.c. of ammonia, at 120° C. for about six hours, the liquid in the tube assumes a yellowish colour, which, after being poured into a capsule, changes to *blue*. The latter colour, after some days, turns to green, and finally fades entirely. Hence, on heating

a strong solution of what is suspected to contain citric acid with ammonia in the above-mentioned manner, the appearance or failure of the blue colour is a positive proof of the presence or absence of citric acid. The reaction occurs in presence of oxalic, citric, and malic acids, even when these acids are present in the proportion of 10 to 1 of citric acid. It fails if the mixture be heated above 160°.

In order to apply this test to the detection of citric acid in fruit juices, the juice is mixed with alcohol, and the mixture filtered after first having been allowed to stand for several hours. Lead acetate is added in excess, the precipitate collected and washed, and ammonia is added in excess. The solution is then evaporated to get rid of ammonia, and sulphuretted hydrogen is added. The lead sulphide is filtered off, the solution heated to expel the sulphuretted hydrogen, barium acetate added in excess, and the precipitate and the liquid heated together; the precipitate is collected on a filter, washed, and decomposed with sulphuric acid. The supernatant liquid is then heated with ammonia in sealed tubes, as above stated.

A New Test for Carbolic Acid. E. W. Davy. (*Pharm. Journ.*, 3rd series, viii., 1021.) When one or two drops of a dilute aqueous solution of carbolic acid are brought in contact with a few drops of a sulphuric acid solution of molybdic acid, there is immediately produced a light yellow or yellowish brown tint, which passing to a maroon or reddish brown, soon develops a beautiful purple coloration, which latter remains without further change for a considerable time. The application of a gentle heat will hasten the development of the purple reaction, though it will take place, but more slowly, at the ordinary temperature; and it is the production of this purple under the circumstances stated that constitutes the test for carbolic acid. The molybdic solution employed by the author for this purpose is similar to the one he has recommended for the detection of alcohol (see *Year-Book of Pharmacy*, 1877, 109), and is prepared by dissolving, with the assistance of a gentle heat, 1 part of molybdic acid in 10 parts by weight of pure and concentrated sulphuric acid. The mode of using this reagent is simply to add three or four drops of it to one or two of the liquid under examination placed on any white porcelain or delf surface, when the effects already noticed will be produced if carbolic acid is present. In carrying out this test it will, however, be found the most convenient to use a small white porcelain capsule furnished with a handle, which will admit of the application of heat when it may be desirable to hasten the reaction by that agent. The heat, however,

ought never to exceed 120° to 130° F., as a higher temperature exercises a destructive effect on the purple reaction.

The great advantage of this test consists in the fact that it does not appear to be much affected or interfered with by the presence of such organic substances as occur in articles of food, drink, or medicine.

The test is of such great delicacy that one small drop of an aqueous solution containing one-thousandth part of its weight of carbolic acid gives an unmistakable result.

Determination of Vapour Densities. V. Meyer. (*Ber. der deutsch. chem.-Ges.*, Dec. 10, 1877, No. 19. From *Chem. News*, xxxvii., 172.) The author describes a greatly simplified apparatus for these determinations, which is essentially the same as that lately described by him to be used with Wood's metal, the latter being replaced, however, by mercury, and the sulphur vapours by those of water, aniline, or ethyl-benzoate. A U tube, open at one end, contains the substance to be experimented upon, and is filled with mercury. It is then hung in an atmosphere consisting of the vapours of one of the above-mentioned liquids until the mercury ceases to flow out. The weight of the mercury which has been ejected, the height of the mercury column in the side tube, temperature, and pressure, supply the necessary data for determining the density.

Composition of Gun Cotton. P. Champion and H. Pellet. (*Comptes Rendus*, lxxxiv., 609–611.) The author found that the principal constituent of gun cotton is not trinitrocellulose, as stated by Abel, but pentanitrocellulose. The numbers obtained in its analysis were C = 26·18, H = 2·81, N = 12·78, O = 58·23. The analysis of a sample of dried gun cotton gave the following results:—

Free Cellulose	1·0 per cent.
Dinitrocellulose	6·0 ,,
Pentanitrocellulose (by difference) .	93·0 ,,

Synthetic Preparation of Formic Acid. V. Merz and J. Tibiriça. (*Ber. der deutsch. chem.-Ges.*, x., 2117.) The authors prepare sodium formate by passing a current of carbonic oxide over soda lime heated to 200°–250° C., at which temperature the gas is rapidly absorbed. The process is suited both for lecture experiments and for the technical preparation of formic acid.

Note on the Alkaloid Sophorine. Dr. H. C. Wood. (*Amer. Journ. Pharm.*, 1878, 283.) The author has tried various processes for the preparation of this alkaloid, and recommends the following as the most satisfactory:—

The powdered beans are first well moistened with strong alcohol and allowed to stand for two hours, the object being to coagulate the albuminous and gummy principles of the bean as much as possible. In order to avoid the extraction of the very abundant colouring matter of the shell, water not too strongly acidulated with muriatic acid is added in considerable quantity after the second hour, and maceration allowed to continue for a week. The expressed liquid is concentrated on a water bath, and when cold rendered decidedly alkaline with carbonate of sodium, and agitated with an equal bulk of chloroform. On standing, the mixture separates into two layers, the lower being an emulsion of chloroform. This, after twenty-four hours, is removed by decantation, or with a pipette, and the supernatant liquid treated with chloroform, as before.

The two emulsions of chloroform having been mixed, are thoroughly agitated with half a volume of water acidulated with muriatic acid. By this procedure the alkaloid is more or less perfectly reconverted into the stable chloride. The chloroform is then recovered by distillation, and the mixture evaporated at a low temperature to the consistency of a thick syrup, care being exercised that the reaction be at all times decidedly acid. To the syrupy liquid strong alcohol is added, and the precipitated gum separated by filtration. The clear liquid is then evaporated upon a water bath until all the alcohol is driven off, and an impure solution of the chloride obtained. This is rendered strongly alkaline with carbonate of sodium, and extracted twice with an equal bulk of chloroform. The chloroform now separates readily, or by means of some of the manœuvres known to every worker in alkaloids, can readily be coaxed into doing so. It is then allowed to evaporate spontaneously. The impure alkaloid left behind is to be purified by solution in a small quantity of water acidulated with muriatic acid, filtering, rendering strongly alkaline with carbonate of sodium, and extracting with chloroform. It is probable that this process would be not only simplified, but also improved, by extracting the first concentrated infusion with strong alcohol, and thereby avoiding the first use of chloroform. This process is, however, here given as it was practised.

Notes on the chemical reactions and the physiological effects of this alkaloid will be found in a subsequent article in Part II. of this volume.

The Alkaloids of Sabadilla. C. R. A. Wright and A. P. Luff. (*Chemist and Druggist*, June, 1878; from a paper read before the

Chemical Society, June 6, 1878.) The authors discuss the results obtained by various chemists and pharmacists—notably Couerbe—who obtained an alkaloid which he termed *veratrine*, which did not crystallize itself, but formed crystalline salts, along with other bodies. Merck, who isolated a crystalline alkaloid which he also termed *veratrine*, although manifestly different from Courbe's product; and more recently the results of Weigelin and Schmidt and Köppen. On examining the methods of extraction employed by these workers, it becomes evident that if the alkaloid is a saponifiable one, it must have been decomposed more or less during the processes of extraction employed by them. The authors have discovered that *Veratrum sabadilla* contains at least two saponifiable alkaloids; so that the discrepancies in the results obtained by former experimenters are accounted for to a great extent by the fact that the processes employed by them (almost invariably involving heating in contact with acids or alkalies, or both successively) must of necessity have yielded substances containing, besides the original base, the products of their alteration and decomposition.

The authors experimented on (1) the *veratria* of commerce; (2) the alkaloids extracted by themselves from *sabadilla seeds*. The commercial *veratria* was proved to be a mixture of alkaloids by saponifying some of it (by heating it with an alcoholic solution of caustic soda for some hours), and getting two different acids from the products of saponification; evidently at least two different alkaloids must have been present in order to have yielded two different acids on saponification. This is extremely probable also from the work of former experimenters, for from the analytical data and general collateral evidences it is clear that the alkaloid termed by Merck *veratrine*, could not have been identical with that termed by Couerbe *veratrine*.

The authors find that *sabadilla seeds* and commercial *veratria* contain three alkaloids, which they propose to distinguish by the names *veratrine*, *cevadine*, and *cevadilline*.

1. *Veratrine*.—This is the veratrine of Couerbe; it is non-crystalline, but furnishes some crystalline salts. Its formula is $C_{37}H_{53}NO_{11}$ under the influence of saponifying agents, it splits up into *dimethyl-protocatechuic acid*, and a new base *verine*, in accordance with the equation,—

$$\underset{\text{Veratrine.}}{C_{37}H_{53}NO_{11}} + \underset{\text{Water.}}{H_2O} = \underset{\text{Dimethyl-protocatechuic acid.}}{C_9H_{10}O_4} + \underset{\text{Verine.}}{C_{28}H_{45}O_8}.$$

The *dimethyl-protocatechuic acid* is proved to be identical with

veratric acid, hence the application of the name veratrine to the alkaloid which furnishes it.

2. *Cevadine.*—This is the veratrine of Merck; it is crystalline, an alcoholic solution of it furnishing anhydrous crystals; its formula is $C_{32}H_{49}NO_9$; under the influence of saponifying agents it splits up into *methyl-crotonic acid*, and a new base *cevine*, in accordance with the equation,—

$$\underset{\text{Cevadine.}}{C_{32}H_{49}NO_9} + \underset{\text{Water.}}{H_2O} = \underset{\text{Methyl-crotonic Acid.}}{C_5H_8O_2} + \underset{\text{Cevine.}}{C_{27}H_{43}NO_8}.$$

The *methyl-crotonic acid* is proved to be identical with *cevadic acid;* hence the application of the name cevadine to the alkaloid furnishing it. That the veratrine of Merck and of Schmidt and Köppen is identical with cevadine is shown on comparing the analytical numbers:—

Calculated for $C_{32}H_{49}NO_9$		Merck. Means of 4 combustions, 1 nitrogen and 4 gold determinations.	Schmidt and Köppen. Means of 4 combustions, 3 nitrogen and 5 gold determinations.	Wright and Luff. Means of 4 combustions, 2 nitrogen and 3 gold determinations.
C in base	64·97	64·81	64·63	64·72
H ,,	8·29	8·71	8·62	8·57
N ,,	2·37	5·50*	2·66	2·31
Au in gold salt	21·08	21·01	21·09	21·02

3. *Cevadilline.*—This alkaloid is non-crystalline; from its insolubility in ether it somewhat resembles the sabadilline of Weigelin and Dragendorff, which the authors, however, have been unable to find either in the *veratria* of commerce or in *sabadilla seeds*, and the existence of which they doubt. The formula of *cevadilline* is $C_{41}H_{53}NO_8$; under the influence of saponifying agents it yields *cevadic acid.*

From 20 pounds of sabadilla seeds 60 to 70 grams of a rough mixture of alkaloids were obtained, which finally yielded 8 to 9 grams of pure crystallized *cevadine*, 5 to 6 grams of *veratrine*, and 2 to 3 grams of rough *cevadilline*, the remainder being mainly a mixture of cevadine and veratrine. From their researches the authors conclude that the veratria alkaloids are closely allied in constitution to the aconite alkaloids, both as regards mode of decomposition when saponified, and as regards their nitrogenous radicals.

* This is only one N estimation, and no doubt is incorrect.

The Alkaloids of the Aconites. Dr. C. R. A. Wright and A. P. Luff. (*Ibid.*, from papers read before Chemical Society, February 7th and June 6th.) The first of these two papers treats of the alkaloids contained in *Aconitum ferox*. The alkaloid pseudaconitin from *Aconitum ferox* forms crystallized salts with difficulty. Aconitin from *A. Napellus*, on the other hand, crystallizes with facility. When acted upon by saponifying agents, pseudaconitin is converted into dymethyl-protocatechuic acid and a new base pseudaconin. Mineral acids saponify pseudaconitin. Tartaric acid forms the anhydro-derivative apopseudaconitin. With glacial acetic and benzoic acids an acetyl and a benzoyl derivative are respectively formed. The properties, constitution, etc., of the above substances have been investigated by the authors. The nitrate and the gold salt of pseudaconitin were obtained in the crystalline form.

The paper read on June 6th deals with *aconitine* and *picraconitine*, and also completes the work on *pseudaconitine*. The roots of *Aconitum Napellus* contain an intensely physiologically active alkaloid *aconitine*, while the *Aconitum ferox* roots yield *pseudaconitine*, which is likewise intensely poisonous; one batch (and one only) of *A. Napellus* roots also yielded the *picraconitine*, which is a comparatively inert alkaloid possessing a bitter taste.

Aconitine.—This alkaloid can be obtained in well defined crystals; it also forms well crystallized salts. It melts at 184° C., and crystallizes in anhydrous crystals from ether, alcohol, and other solvents. Aconitine is a readily saponifiable alkaloid; when treated with saponifying agents it takes up a molecule of water and splits up into *benzoic acid* and a new base called *aconine*, in accordance with the equation,—

$$\underset{\text{Aconitine.}}{C_{33}H_{43}NO_{12}} + \underset{\text{Water.}}{H_2O} = \underset{\text{Benzoic Acid.}}{C_7H_6O_2} + \underset{\text{Aconine.}}{C_{26}H_{39}NO_{11}}.$$

This decomposition of aconitine is perfectly parallel with that of pseudaconitine, which splits up into *dimethyl-protocatechuic acid* (veratric acid) and *pseudaconine*, thus:—

$$\underset{\text{Pseudaconitine.}}{C_{36}H_{49}NO_{12}} + \underset{\text{Water.}}{H_2O} = \underset{\text{Veratric Acid.}}{C_9H_{10}O_4} + \underset{\text{Pseudaconine.}}{C_{27}H_{41}NO_9}.$$

The decomposition of these alkaloids is most readily brought about by boiling with an alcoholic solution of caustic soda; it is also effected, though more slowly, in the cold by allowing them to stand in contact with alcohol, dilute mineral acids, alkalies, etc. A base

was described by Hübschmann as existing in the aconitine of commerce, which he called *acolyctine*. From the description of this base there can be no doubt that it is *aconine*, the decomposition base of aconitine, most likely produced by the decomposition of part of the alkaloid during the process of extraction. Another base—"lycoctonine"—is said to exist in the *Aconitum lycoctonum*. It is probably nothing more than a mixture of pseudaconitine, and its decomposition base pseudaconine, a mixture of these alkaloids agreeing in every respect with the description of "lycoctonine."

By heating aconitine with strong tartaric acid solution, or with dilute hydrochloric acid, it loses a molecule of water, and forms an anhydro-derivative *apoaconitine*, thus :—

$$\underset{\text{Aconitine.}}{C_{33}H_{43}NO_{12}} = \underset{\text{Apoaconitine.}}{C_{33}H_{41}NO_{11}} + H_2O.$$

Aconitine and pseudaconitine, when treated with organic anhydrides (acetic and benzoic), lose the elements of water, and in place of hydrogen take in an acid radical.

Preparation of Aconitine for Medicinal and Pharmaceutical Purposes.—To exhaust aconite roots, the alcohol used for percolating should be acidified with *tartaric acid*, not with *sulphuric acid*, as the latter acid extracts more non-crystalline bases than the former, as shown by the following experiments :—

	Alkaloids obtained by Tartaric Acid.	Alkaloids obtained by Sulphuric Acid.
Crystalline bases	60 per cent.	20 per cent.
Non-crystalline bases	40 ,,	80 ,,

To obtain the aconitine in a pure condition, the alkaloid should be converted into a crystalline salt (nitrate or hydrobromide), and the aconitine regenerated therefrom by agitation with carbonate of soda and ether.

Alcoholic Potash. E. J. Maumené. (*Comptes Rendus*, 1878, No. 14; *Chemical News*, 1878, 203.) The author maintains that alcoholic solution of potash is converted, in course of time, into a neutral salt, the acid of which is richer in hydrogen than any other known, its formula being $C_4H_8O_4$. This salt is rendered anhydrous by desiccation at 100°. It is very deliquescent, especially in moist air, and its solution has a very faint and slightly bitter taste. Its action with metallic salts is very characteristic: if concentrated, it forms with all a magma very similar to that produced by the mixture of caustic potassa with calcium chloride; if diluted, it precipitates ferric, mercuric, plumbic, and

platinic solutions. The ferric precipitate is a yellowish white, and is redissolved by boiling with an excess of the salt alluded to; that of silver is a pale yellow, like silver phosphate, but becomes black in a short time. That of platinum (chloride) is the double chloride of platinum and potassium, and its formation is accompanied by a brisk effervescence. The same phenomenon is still more marked with bismuth nitrate, where a white precipitate is deposited. Gold chloride gives no precipitate in the cold, but merely a faint brown coloration. On ebullition gold separates out, and the liquid takes a pale violet coloration. Chrome alum, ammoniacal or potassic, gives a deposit which easily redissolves if the chrome is in excess.

Formation of Metallic Arsenides. A. Descamps. (*Comptes Rendus*, 1878, No. 16; *Chem. News*, 1878, 226.) On attempting to prepare metallic arsenides by submitting arsenites or arseniates to the reducing action of hydrogen, carbonic oxide, or coal gas, the author obtained very imperfect results. He also reduced arseniates in a crucible with potassium cyanide in excess, so as to form a liquid layer which might preserve the compound from the action of the atmosphere. In these experiments he continued the application of heat till arsenical vapours no longer escaped. With many metals, however, arsenic does not form absolutely definite compounds, but alloys, which, after being heated for a certain time, may lose arsenic and change their composition. He has also prepared arsenides by the direct action of metallic arsenic upon the metal in a current of hydrogen, or, preferably, by heating the metal in a crucible along with excess of arsenic and borax as a flux. The arsenides of copper, gold, and silver have been prepared by placing metallic arsenic in solutions of copper sulphate, silver sulphate, or gold chloride.

A New Test for Glycerin. Dr. A. Senier and A. J. G. Lowe. (*Chem. News*, xxxvii., 245.) This test is founded on the fact observed by Iles, that borax when treated with glycerin gives to a Bunsen flame the green colour characteristic of boracic acid. The test is thus applied by the authors:—The solution is rendered slightly alkaline by dilute soda, and a borax bead placed in it for a short time. The bead is then held in a Bunsen flame. If the solution contains 1 per cent. of glycerin, a distinct reaction is observed (erythrite and glycol give the same colour), or a little of the solution is mixed with some powdered borax, and some of the mixture placed on a platinum loop, and heated as before. By means of this test, after concentration, etc., one-tenth of a per cent. of glycerin was detected in beer; 1 per cent. in sherry; 1 per cent. in milk; 5 per cent. in treacle.

Aconitic Acid in Crude Sugar. A. Behr. (*Ber. der deutsch. chem.-Ges.*, x., 351.) The author detected aconitic acid in crude sugar to the extent of ·149 per cent., and also in the preserved juice of the sugar-cane. Cuban sugars separated from their aqueous solution minute crystals of calcium aconitate, from which he obtained the acid in a perfectly pure state; the fusing point of the pure acid was found to be 188° C. The precipitate formed on the addition of alcohol to an aqueous solution of crude sugar was also observed to contain oxalic acid.

Detection of Free Sulphuric Acid in Adulterated Vinegar. (*Pharmaceut. Centralhalle*, 1877, 329.) Nessler's test for the detection of sulphuric acid in vinegar is best conducted as follows:—Strips of filtering paper twelve to fifteen inches long are so suspended that only the lower edge dips into the vinegar, which thus ascends in the paper by capillary attraction, the sulphuric acid not being volatile accumulates in the upper portion of the strips. After twenty-four hours the strips are removed and dried in a water bath, when their upper extremities will appear brown or black, and more or less rotten from the action of the adulterant. The addition of ·5 per cent. of sugar to the vinegar to be tested is said to increase the delicacy of the reaction.

Estimation of Phosphoric Acid in the Presence of Silicic Acid. R. W. Atkinson. (*Chem. News*, xxxv., 127.) The author contradicts a statement made by Jenkins (*Journ. prakt. Chem.* [2], xiii., 237–239), that the presence of silicic acid did not interfere with the results obtained in the estimation of phosphoric acid. He finds that unless the silica be completely removed previously, the results of the determination are quite unsatisfactory.

A New Formation of Salicylic Acid. F. Hermann. (*Ber. der deutsch. chem.-Ges.*, x., 646, 647. From *Journ. Chem. Soc.*) This acid was obtained, together with ethyl succinylosuccinate, by the action of an excess of sodium on ethyl-succinate, the bodies being left together for months. The formation of salicylic acid under these conditions is easily understood from the constitution of the ether:—

$$\begin{array}{l} CH_2 - CO - CH - CO_2.\ C_2H_5. \\ \vert \qquad\qquad\qquad \vert \\ CH_2 - CO - CH - CO.\ C_2H_5. \end{array}$$

Hypophosphoric Acid. F. Salzer. (*Liebig's Annal.*, clxxxvii., 322-340; *Journ. Chem. Soc.*, Dec., 1877.) The acid syrup formed

when phosphorus, partially covered with water, is exposed to the air (Pelletier's *acide phosphatique*), contains phosphorus, phosphoric, and hypophosphoric acids. The last-named acid is produced by the action of the air on phosphorous acid. It may be separated in the form of a sparingly soluble sodium salt by treating the mixed acids with sodium carbonate or acetate.

Pure hypophosphoric acid is best obtained by treating the lead salt suspended in water with hydrogen sulphide. Its aqueous solution is strongly acid, colourless, and inodorous, and may be boiled without decomposition; but when evaporated to a syrupy consistence it is resolved by heat into phosphorous and phosphoric acids. In its behaviour with reagents it is intermediate between phosphorous and phosphoric acids, which circumstance accounts for its having been so long overlooked in a mixture of these acids.

The acid is perfectly stable in aqueous solution, and is not affected by strong acids in the cold, but when boiled with dilute sulphuric or nitric acid it is resolved, at a certain state of concentration, into phosphorous and phosphoric acids. The solution of the acid is not oxydized when warmed with dilute hydrogen peroxide, and is not affected by potassium chromate, chlorine, or iodine, even at the boiling heat; neither does it reduce mercurie, auric, or platinic chloride. It produces in solutions of silver a white precipitate, which does not blacken on boiling. The solution is oxydized by potassium permanganate, slowly in the cold, and very rapidly when heated, being converted into phosphoric acid. It is not affected by hydrogen sulphide, sulphur trioxide, or naseent hydrogen.

Hypophosphoric acid is bibasic, and is represented by the formula $H_2 P O_3$, corresponding with the anhydride $P_2 O_4$. The salts of hypophosphoric acid resemble in general those of hypophosphorous and phosphorous acids, being, however, much more stable. At high temperatures they give off hydrogen or hydrogen phosphide, leaving metallic phosphide or phosphate.

The *acid sodium salt*, $Na H P O_3 + 3 H_2 O$, is formed on adding sodium acetate in excess to the syrupy liquid produced by the oxydation of moist phosphorus in the air. It crystallizes in oblique rhomboic prisms, which dissolve in 45 parts of cold, and 5 parts of boiling water. When gently warmed it loses its water of crystallization, and afterwards gives off inflammable hydrogen, leaving metaphosphate. At ordinary temperatures, both the salt and its aqueous solution are perfectly stable.

The *neutral sodium salt*, $Na_2 P O_3 + 5 H_2 O$, obtained by neutralizing the acid salt with sodium carbonate, crystallizes in needles,

which dissolve in about 30 parts of cold water, forming a feebly alkaline solution.

The *lead salt*, $Pb\,P\,O_3$, is precipitated by the acid sodium salt from a solution of neutral or basic acetate, in the form of a white powder, insoluble in water, dilute acetic acid, and hypophosphoric acid; but soluble in dilute nitric acid. It is easily decomposed by dilute sulphuric acid.

Curarine. T. Sachs. (*Liebig's Annal.*, cxci., 254–260.) The author criticises the results obtained by Dr. Preyer in 1865 (*Journ. für prakt. Chemie*, 98, 228), and shows that the crystalline *curarinum sulphuricum* of the latter is impure, containing phosphate and carbonate of lime, and is, moreover, almost inert in a physiological point of view. He finds that Preyer's process for the isolation of curarine is impracticable, since curare gives up mere traces of soluble matter when treated with absolute alcohol. Curarine gives with sulphuric acid not a blue colour, as asserted by Preyer, but a red one. In crude curare, it occurs not as an acetate, but a sulphate. The formula of curarine, as deduced from analysis of the picrate, is $C_{18}H_{35}N$. Curarine, hydrochloride, and sulphate, are both very unstable, and not crystallizable. Solution of curarine acetate gives with *sodium platinochloride* a bulky yellowish white precipitate of the formula $2\,(C_{18}H_{35}N, H\,Cl) + Pt\,Cl_4$, which speedily decomposes, assuming a violet colour. The acetate gives precipitates also with potassio-mercuric iodide, potassio-cadmium iodide, potassium platinocyanide, gold chloride, tannin, picric acid, potassio-mercuric chloride, sodium phosphate, sodium arsenate, potassium iodate, potassium thiocyanate, and potassium ferro-cyanide and ferri-cyanide.

Pancreatin. (*Chemist and Druggist*, 1878, 210.) Good pancreatin should possess the following characters. It is a yellowish red hygroscopic powder; its smell and taste are strong and peculiar; it contains 70 per cent. of soluble matter; and its solution, like albumen, coagulates by heat. It digests thirty times its weight of albumen, saccharifies eight times its weight of starch, and completely emulsifies at least ten times its weight of fat.

Detection of Sugar in Glycerin. R. Böttger. (*Zeitschr. für analyt. Chem.*, 1877, 508.) This test is based on the well-known property of solutions of molybdic acid in mineral acid to yield a blue coloration with sugar, alcohol, and other reducing substances. 5 drops of the glycerin to be tested are mixed with 100 drops of water; to this mixture 1 drop of nitric acid (1·30 sp. gr.) and 3 to 4 centigrams of molybdate of ammonium are added, and the whole

heated to the boiling point, when in the presence of sugar the mixture assumes a deep blue colour. With pure glycerin the mixture remains colourless.

Note on a New Reaction of Manganese. J. B. Hannay. (*Journ. Chem. Soc.*, 1878, 269.) When a solution of a manganous salt in strong nitric acid is warmed, with the addition of crystals of potassium chlorate, the whole of the manganese is precipitated as manganous manganate. When a salt of iron is present, the manganese is still precipitated, but in combination with the iron, as a double manganate of iron and manganese, of the formula,—

$$2\,Fe_2(Mn\,O_4)_3.\,Mn\,Mn\,O_4.\,12\,H_2O, \text{ or } Fe_2(Mn\,O_4)_3\,Mn\,O_2.\,6\,H_2O.$$

The manganese dioxide precipitated when there is no iron present seems to be identical with the mineral *pyrolusite*, as it is in crystalline plates, which in mass are black, but in small quantity, as seen under the microscope, steel-grey. The thinner plates are transparent, having a reddish colour; and the compound contains no water. On ignition it is converted into manganoso manganic oxide, which often retains the plate form of the original dioxide.

New Tests for Carbolic and Nitric Acids. D. Lindo. (*Chem. News*, xxxvi., 155 and 179.) If 30 drops of a cooled mixture, composed of two parts of concentrated sulphuric acid and one of water by measure, are added to eight or ten drops of an aqueous solution of carbolic acid (say 15 grains to an ounce of water) contained in a small porcelain dish, no colour is observed; but on adding one or two drops of nitric acid, a deep brown colour is immediately developed, which, on agitating the vessel, quickly changes to a beautiful red.

The author proposes to apply this reaction as a test for carbolic acid.

With certain nitrates in solution the reaction is far more sensitive than with nitric acid. The solutions should not be too strong.

It is advisable to dilute the sulphuric acid as above in testing with nitric acid, as the colours are produced with more certainty than when concentrated sulphuric acid is employed; but the latter should be used when testing with nitrates.

With eight or ten drops of carbolic solution (5 grains to an ounce of water) a very beautiful reaction is obtained with a drop or two of nitric acid.

With eight or ten drops of carbolic solution (2 grains to the ounce) the colours are easily produced with two or three drops of solution of nitrate of silver or proto-nitrate of mercury, not too strong.

With a little care the reactions can be obtained with one drop of these carbolic solutions.

Nitrate of silver and proto-nitrate of mercury, with careful manipulation, can be made to reveal the presence of carbolic acid in a solution of one grain in ten ounces of water; but of this dilute solution at least thirty drops must be used, mixed with about ninety drops of concentrated sulphuric acid. After adding the test fluid, the dish should be left at rest for a little, and then gently shaken. The brown colour is rarely observed with these weak solutions.

In testing solutions of ordinary strength, place eight or ten drops in a small porcelain dish, and add about thirty drops of concentrated sulphuric acid if you are going to test with a nitrate. Move the vessel about to mix its contents, and allow two or three drops of the test fluid to flow down the side of the dish into the hot mixture. On giving the vessel a rotatory motion, the final colour is soon obtained, which with most nitrates is a deep magenta, of great purity and beauty if the carbolic solution was tolerably strong and the sulphuric acid employed colourless. If the colour is not very full at first, a little more of the carbolic solution will bring it up.

With weak carbolic solutions, the final, and sometimes the only colour observed, is purple or pink.

Mercurous nitrate gives a very bright yellow at first, changing to brown, and then to red, which makes it an excellent test. This yellow colour is a highly sensitive reaction, and can be plainly seen with carbolic solutions so weak that the final pink is barely or no longer discernible.

These reactions suggest the use of a mixture of carbolic and sulphuric acids as a test for nitric acid. A carbolic solution, 5 grains to an ounce of water, answers well for the purpose, and may be taken as a standard solution in testing for nitric acid in the nitrates. It should be used pretty fresh; the more so the better for all except highly dilute solutions of nitrates.

In testing minute quantities of nitrates in the solid state by this method, transfer the substance to a small porcelain capsule, and dissolve it in two or three drops of the carbolic solution (5 grains to the ounce), then add cautiously three or four drops of concentrated sulphuric acid.

If the colour is not very full at first, this may arise from the amount of nitrate being too large for the quantity of carbolic solution employed, in which case the addition of a little more of the latter will greatly improve the reaction.

In testing *solutions*, supposed to contain traces of nitrates, a very

good method is to mix 30 minims of the suspected fluid with the same bulk of pure and highly concentrated sulphuric acid in a small porcelain basin. Give the vessel a slight rotatory motion to ensure complete mixture, and *at once* pour a small quantity of the carbolic solution gently down the side of the dish, so that it may spread over the surface of the hot mixture. If the dish is left undisturbed, the colour soon appears if nitric acid is present. But if the temperature of the mixture is allowed to fall before adding the carbolic solution, the experiment will fail with these minute traces of nitrates, and by applying heat afterwards the colour will rarely be developed in a satisfactory manner.

When applying the test the other way—that is, by mixing the carbolic solution with sulphuric acid, and adding two or three drops of the nitrate solution—it is perhaps preferable to mix the carbolic solution with an equal volume of concentrated sulphuric acid, instead of with three times the quantity as formerly prescribed.

If strong hydrochloric acid is mixed with some carbolic solution, and a little nitric acid added, no colour is observed at first, or only yellow, but on applying heat the magenta colour appears. Boiling the mixture destroys the colour. The same results are obtained with nitrates, but sulphuric acid is much to be preferred to hydrochloric in making use of the reaction as a test for nitric acid.

Chlorates, iodates, chromate of potash, ferricyanide of potassium, and other oxidizing agents, if added to the mixture of carbolic and sulphuric acids, produce olive, yellowish green, and dirty brown colours, which in no way resemble, and therefore cannot be mistaken for, the colours obtained with nitric acid. The presence of any of these substances, however, would of course interfere more or less with the action of the test.

The author has been unable to trace the changes that take place when these three acids are brought together in the manner described.

The action of nitric acid alone on carbolic acid is well understood, but it appears that some reaction, not hitherto recorded, takes place between these two substances in the presence of another and more powerful acid. Possibly some organic base is formed which unites with the stronger acid, in which case the highly coloured fluid obtained would be a solution of the salt thus produced in the excess of strong acid.

Notes on the Carbolic Test for Nitric Acid. D. Lindo. (*Chem. News*, xxxvii., 3.)

1. The deep magenta colour produced by this test disappears

on the addition of water; the fluid acquires a yellowish tint, and a slight brown precipitate subsides. On evaporating the solution the red colour reappears.

2. Alkalies in excess change the magenta colour to green. On adding sulphuric acid again in excess the magenta colour returns.

3. The green coloured fluid produced by the action of alkalies in excess on the magenta can be diluted with water without suffering change. The reaction is sensitive, and useful as affording additional proof of the presence of nitric acid, which may be required where in applying the red test too much carbolic acid has been used for the quantity of nitric acid present. In this case the colour, instead of being a bright pure magenta, will incline to brown. With this reddish brown fluid the green colour can be obtained quite distinctly on addition of an alkali in excess if the original colour was caused by the presence of nitric acid. The test may be applied as follows:—

4. Place some solution of ammonia (*Liq. Ammon. Fort.*, diluted with 2 parts of water) in a small dish, and let one drop of the magenta-coloured fluid at a time trickle down the side of the vessel into the alkali. Some care is required, as the fluid may spirt. With the fixed alkalies no spirting occurs, but, according to my observation, the colour produced is not so fine as with ammonia. The green colour is developed immediately the fluids come in contact, and is often very bright. Sometimes, however, it is otherwise, and I have found some magenta fluids give a yellow instead of green colour on addition of alkalies, which appears to be due to nitric acid being in excess of carbolic in the red fluid.

5. If some sulphuric acid is placed in a test tube, and a small quantity of the green fluid allowed to flow (a drop or two at a time) gently down the side of the tube, the red colour will appear when the green fluid reaches the acid at the surface of contact.

6. A solution of nitre was made in the proportion of 1 grain to 160 ounces of distilled water. Half an ounce of this solution mixed with an equal bulk of sulphuric acid gave a reaction, though not a very distinct one, on addition of some carbolic solution. The sulphuric acid and water had been previously tested, and found free from nitric acid.

7. The magenta colour is developed very imperfectly or not at all if the nitric acid is very much in excess of the carbolic. Want of knowledge of this fact might lead to the inference that nitric acid was absent, or present in only minute quantity, in cases where it is really in excess. With excess of carbolic the colour inclines to brown, as stated above. If these facts are borne in mind, and a

little care taken in applying the test, the colour can always be obtained of great purity and beauty.

The Boiling Points of Sulphuric Acids of different Strengths. G. Lunge. (*Ber. der deutsch. chem.-Ges.*, x., 370.) The author's results are tabulated as follows:—

Per cent. of H_2SO_4.	Boiling Point, degrees.	Per cent. of H_2SO_4.	Boiling Point, degrees.
5	101	70	170
10	102	72	174·5
15	103·5	74	180·5
20	105	76	189
25	106·5	78	199
30	108	80	207
35	110	82	218·5
40	114	84	227
45	118·5	86	238·5
50	124	88	251·5
53	128·5	90	262·5
56	133	91	268
60	141·5	92	274·5
62·5	147	93	281·5
65	153·5	94	288·5
67·5	161	95	295

Detection of Zinc and Copper in the Human Body. F. Raoult and H. Breton. (*Comptes Rendus*, lxxxv., 40–42; *Journ. Chem. Soc.*, 1877, 928.) As the presence of the above-mentioned substances in the human body, under ordinary circumstances, was pointed out some time ago, but nevertheless the question is still discussed by toxicologists, the authors have thought it advisable to publish the results of a judicial investigation made by them in 1874. From their experiments it appears that 500 grams of dry liquorice root furnished neither zinc nor copper. 400 grams of the intestines of a healthy man killed by accident gave no copper and only slight traces of zinc. 700 grams of the liver of a man who died in the hospital of Grenoble furnished 2 milligrams of copper and 7 milligrams of zinc. 400 grams of liver of a consumptive patient gave 6 milligrams of copper and 12 milligrams of zinc.

It appears, then, that the human body ordinarily contains copper and zinc, in quantities varying probably according to age, state of health, the nature of the food, and the kind of vessels in which it has been contained.

Hence it follows that to obtain chemical demonstration of poisoning by zinc or copper compounds, it is not sufficient to establish the

mere presence of these metals in the body; but it must be further shown that the quantities found in a given weight of the incinerated substance are sensibly greater than the maximum quantity which might be found by similar means in an equal weight of substance obtained from the bodies of persons who had lived under similar conditions.

To prepare the animal matter for testing, the authors proceed as follows:—The substance is carbonized with addition of a little sulphuric acid; the charcoal is heated to redness, and in great part burned in contact with the air; and when the combustion becomes difficult, in consequence of the softening of the residue, this residue is exhausted with a small quantity of nitric acid and water; the incineration is completed, the ashes treated with nitric acid, and the several liquors thus obtained are united and evaporated to dryness. The failure of certain toxicologists to detect copper and zinc in the body under ordinary circumstances is attributed by the authors to the neglect of proper precautions. They observe that copper especially remains obstinately fixed in the charred mass in spite of prolonged washing with hot nitric acid, and to reveal its presence it is necessary to incinerate the charcoal; and it is just this point which most experimenters appear to neglect.

Presence of Zinc in the Bodies of Animals and Plants. G. Lechartier and F. Bellamy. (*Comptes Rendus*, lxxxiv., 687–690.) Zinc, like copper, appears to be a frequent if not a constant constituent in the animal and vegetable organism. The authors found 2 centigrams of oxide of zinc in a human liver weighing 1780 grams, and 3 centigrams in a kilogram of lean beef. They have also detected it in the livers of various animals, in eggs, and in a variety of cereals and vegetables.

Oxalic Acid in the Urine. P. Fürbringer. (*Chem. Centralhalle*, 1877, 197; *Journ. Chem. Soc.*, 1878, 162.)

The author's observations lead to the following conclusions:—

1. Oxalic acid is a normal and perhaps constant constituent of urine.

2. The quantity normally excreted appears not to exceed 20 milligrams per day.

3. The amount of calcium oxalate which separates even after standing for twenty-four hours affords no criterion of the total amount of oxalate in the urine.

4. The chief solvent for calcium oxalate in the urine is acid sodium phosphate.

5. The amount of oxalic acid is diminished by taking a dose of sodium bicarbonate, and is not increased by lime water or urates.

6. There is no constant relation between a large increase of oxalic acid and the stoppage of the normal process of oxidation, neither is the elimination of the acid hindered by fever.

Potomin, an Alkaloid of the Corpse. Prof. Selmi. (*Zeitschr. des oesterr. Apoth.-Ver.*, March 1st, 1878. From *Chemist and Druggist.*) The author has succeeded in extracting, by means of alcohol, from four corpses which had been buried from one to six months, an alkaloid to which he has given the above name. It was thus prepared :—Portions of the bodies having been subjected to the action of alcohol, the spirit was treated with sulphuric acid and distilled in an atmosphere of hydrogen. The residuum was filtered to get rid of fatty matters, and precipitated with acetate of lead. The lead precipitate was again filtered, and the excess of lead removed by a stream of sulphuretted hydrogen. The pale yellow fluid thus obtained was evaporated to a syrupy consistency and decomposed with baryta. It was next evaporated with ether, when a substance of peculiar smell, and somewhat astringent but not bitter taste was yielded. According to the author, this potomin, when injected into the jugular veins of frogs and rabbits, produced no toxic influence. But Drs. Morrigia and Battisteni, in repeating and somewhat varying the author's experiments, found that by means of amyl and ethyl-alcohol poisonous principles could be extracted.

Cadaveric Alkaloids and their Importance in Toxicology. Prof. F. Selmi (*Moniteur Scientifique*, May, 1878 ; *Chem. News*, xxxvii., 264.) In the course of toxicological experiments the author has discovered, in extracts obtained from the bodies of persons who had died naturally, several substances possessing the general characters of the alkaloids, and has found that they are derived from the spontaneous decomposition of the cadaveric matter. Some of them are fixed, and others volatile; some are soluble in ether, others insoluble in that medium, but soluble in amylic alcohol; and others, again, insoluble in both these liquids. Generally the fixed cadaveric alkaloids yield a precipitate with almost all general reagents. Some of them are precipitated by platinic chloride, with argento-potassic cyanide, and with potassic bichromate. They may give rise, with iodurettted hydriodic acid, to crystalline compounds often resembling those formed by the same reagent with certain vegetable alkaloids. They yield coloured reactions which, however, in certain cases are not produced according to the conditions of putrefaction. Of these coloured reactions, the following are the principal: Sulphuric acid, moderately concentrated, gives a red-violet coloration. Hydrochloric acid, mixed with sulphuric acid and applied hot, a red-violet

Sulphuric acid and bromine water, a red coloration more or less distinct, which fades after a certain time. Nitric acid, gently heated and followed by potash, gives a beautiful golden yellow. Iodic acid, sulphuric acid, and bicarbonate of soda form a violet rose more or less distinct. These compounds are easily oxidized, and turn brown on exposure to the air, evolving a peculiar urinous odour; at other times the odour is like that of conine, and sometimes they exhale a perfume like that of certain flowers. They generally possess a pungent taste which benumbs the tongue; in some cases the flavour is bitter. Some of these compounds have no injurious effects upon animal life, but others are powerfully poisonous. The symptoms produced are transient dilatation of the pupils, slackening and irregularity in the pulsations of the heart, and convulsions. After death the heart is found contracted and void of blood.

MATERIA MEDICA.

PART II.

MATERIA MEDICA.

A Fast-growing Cinchona which produces much Quinine. Dr. J. E. de Vrij. (*Pharm. Journ.*, 3rd series, viii., 805.) In answer to an inquiry as to which species of cinchona produces the largest amount of bark in a given time, the author was informed by the late Mr. McIvor that *Cinchona succirubra* had produced in the same period of growth more than twice as much stem bark as any of the other species in cultivation; and that *C. pubescens*, Howard, would produce nearly twice as much stem bark, in the same period of growth, as *C. succirubra*. Subsequently he received a specimen of the bark of *C. pubescens*, which upon analysis was found to yield 5·728 of pure quinine = 7·637 of crystallized sulphate, 0·926 of cinchonidine, 0·937 of cinchonine, and 1·111 of amorphous alkaloid.

The author considers it desirable that something more should be known about this fast-growing cinchona, and expresses a hope that Mr. J. E. Howard may give some further information on the subject. He (Dr. de Vrij) is inclined to suppose that the fast-growing cinchona in question is a hybrid with pubescent form, to which Mr. McIvor, in consequence of his correspondence with Mr. Howard on this subject, has given the name of *C. pubescens*, Howard.

The Fast-growing Variety of Cinchona called Pubescens. J. E. Howard. (*Ibid.*, 825.) The author's analyses of a specimen of this bark, obtained from Mr. McIvor in 1873, confirm and even surpass the results obtained by Dr. de Vrij; showing it to be capable of producing 6 per cent. of sulphate of quinine, 5 of sulphate of cinchonidine, and 1·20 of cinchonine and amorphous alkaloid. Even this was exceeded after an additional year's growth. The specimen received in 1874 consisted of strips of bark which had been left untouched the year before, whilst the intermediate strips had been removed. The analysis of these strips gave numbers equal to,—

	Per cent.
Sulphate of Quinine.	6·94
,, Cinchonidine	4·48
,, Cinchonine	0·20
,, Quinidine	0·14
Amorphous Alkaloid	1·14
	12·90

The author objects to the designation *C. pubescens*, Howard, as entirely erroneous; the tree in question being not a separate species, but only a variety of *C. officinalis*. He states that about ten years ago the late Mr. McIvor raised from seed two sorts of *C. officinalis*, which for some reason he considered to be hybrid with *C. succirubra*. The two were alike distinguished by strong and vigorous habit of growth; and at a little distance it was difficult to discriminate between them. As they developed, however, it was found that the one with slightly pubescent leaves yielded much more quinine than the other. For the sake of distinction he (Mr. Howard) suggested to call this variety *pubescens*, and this explains the origin of the erroneous appellation above alluded to.

The author also alludes to the real *C. pubescens*. This very distinct species was named by Vahl, and has been described and figured by Dr. Weddel. It is the source of the bark from which aricine was first procured, and from whence he (Mr. Howard) has many times obtained this much contested alkaloid himself. Its whole chemical constitution is distinct from other cinchonæ, the cinchona red being superseded by an intensely yellow substance. It is no longer to be met with in commerce, as it is useless except for scientific investigation, and has certainly never been introduced into India.

Croton Oil. H. Senier. (From a paper read at the meeting of the Pharmaceutical Society, March 6th, 1878, and reported in the *Pharm. Journ.*, 3rd series, viii., 705.) In studying the solvent action of rectified spirit upon croton oil (5 volumes of spirit to 1 volume of the oil), the author obtained the following results :—

No.	Age.	Percentage dissolved.
1.	Freshly expressed	20
2.	Three months	40
3.	Three years	55
4.	More than three years	60
5.	Age unknown	35

which show that the solubility of this oil in alcohol increases with the age. The portion insoluble in alcohol is incapable of producing the characteristic eruption when applied to the skin, while the portion soluble in alcohol possesses the vesicant properties of the oil in a remarkable degree. From these results the author concludes that for medicinal and pharmaceutical purposes, an oil extracted by alcohol would be a more satisfactory preparation than the crude oil. Prof. Bentley, however, in the discussion which followed the reading of the author's paper, pointed out that the superiority of

the oil extracted by alcohol was only proved with reference to its vesicant action, but it did not follow that the purgative principle was the same as the vesicating principle.

The portion soluble in alcohol is a viscid reddish brown oil, with a slight fluorescence, and the strong characteristic odour of croton oil. It is turbid owing to the suspension of a quantity of acicular crystals, which are soluble on slightly warming the oil. At a temperature of 50° Fahr. the oil is too viscid to flow, and at 32° Fahr. it becomes of the consistence of butter. At 60° Fahr. it has a specific gravity of ·987. The oil insoluble in rectified spirit is at ordinary temperatures of a light yellowish colour, not fluorescent, having a very slight odour, quite clear, and begins to thicken only at a temperature of 16° above zero, Fahr. It has a specific gravity of ·924 at 60° Fahr. The oil soluble in alcohol when heated to 460° Fahr. by itself, and to 360° Fahr. with hydrochloric acid, and to the same temperature with a strong solution of potassium hydrate, does not appear to lose any of its activity; therefore the active principle is probably not volatile.

The Properties and Uses of Eucalyptus. Prof. Bentley. (From the author's lecture delivered before the Pharmaceutical Society, April 17th, 1878, and reported in the *Pharm. Journ.*, 3rd series, viii., 866.) The first and most important influence which the *Eucalyptus globulus* is now commonly said to exert, and that which has brought it more especially into notice, is its power of improving miasmatic climates by destroying the paludal miasm which causes fever in such districts; from which circumstance it has been called "the fever-destroying tree."

Its influence in this respect was first noticed in its native country, Australia, and evidence to the same effect has now been obtained from all parts of the world where it has been introduced; and which are favourable to its growth. Thus, in Algeria, where it has been tried on a large scale; and in Spain, districts previously noted for their pestilential air, and consequent prevalence of fever, have now become quite free from disease. At the Cape also, in a very few years, its cultivation has completely changed the climatic condition of the unhealthy parts of that colony; thus, in the neighbourhood of Constantia especially, it has been stated that a noted fever spot, which was covered with marsh water both in winter and summer, has in five years been dried up by the planting of 14,000 of these trees, and the inhabitants now enjoy excellent health. In Cuba again, marsh diseases are fast disappearing from the unhealthy districts where this tree has been introduced. An interesting state-

ment to the same effect has recently also been reported from Italy, where the planting of some Eucalyptus trees, which in six years had grown to a height of over thirty feet, had rendered healthy a part of the Campagna which had hitherto been regarded as the most fever-stricken part of that unhealthy district. The tree has now been planted to a large extent in Italy, and hopes are entertained that in a few years malaria will be as effectively expelled from that country as ague has been from Lincolnshire. The testimony in favour of its anti-malarial influence is so strong that, allowing for exaggeration in some cases, it can scarcely be doubted that this tree does produce a most beneficial effect by destroying the fever-producing miasm of marshy districts; and that it should consequently be introduced into all countries and districts where the climatic influences are favourable for its development, and where such miasmatic emanations are to be found.

The influence of the Eucalyptus in this respect is commonly regarded as being serviceable in two ways. First, by the far-spreading roots of this gigantic tree pumping up water as it were, and thus draining the soil; and secondly, by the odorous emanations from its leaves having a disinfectant and antiseptic influence on the paludal miasm. The influence of the latter has been generally supposed to be but small, but in a lecture on the Eucalyptus delivered at the Royal Botanic Gardens in 1874, the author stated his reasons for believing that the emanations from the leaves of groves of Eucalyptus had some influence in destroying marshy miasms, and thus improving the healthiness of the district. Since then the very interesting investigations of Kingzett have proved that under the influence of air and moisture, both peroxide of hydrogen and camphoric acid are formed from volatile oils, the former a powerful disinfectant, and the latter an antiseptic; and hence there can now be no doubt, that the healthy influence of Eucalyptus trees is, to some extent at least, and probably more than we imagine, due to the volatile emanations from the leaves under the influence of air and moisture, possessing direct disinfectant and antiseptic properties, and thus destroying the injurious effects of paludal miasms.

Another circumstance which has an important bearing upon the antiseptic properties of the leaves of Eucalyptus is that the *eucalyptol* of Cloez, the chief constituent of the volatile oil contained in the leaves, has been recently proved to possess great antiseptic properties.

The greatest influence in the author's opinion is produced by the

power the roots possess of absorbing water from the soil. It is stated that a moderate sized Eucalyptus tree absorbs as much as ten times its weight of water from the soil; and hence, allowing for exaggeration, the enormous suction power of large plantations of such trees may in some degree be judged of; so that when thickly planted in marshy places, "the subsoil is drained in a little while as though by extensive piping." That the main influence of Eucalyptus trees is thus due to the absorptive power of the roots is also borne out by the fact that other plants of rapid growth, when planted in marshy districts, have a sensible effect in diminishing their malarial influence. This is notably the case with the sunflower, which is grown for this purpose to a large extent in the swampy regions of the Punjab and other parts of the world; and the effect has been that districts which were previously remarkable for their insalubrity are now reported to be entirely free from miasmatic fever.

The leaves of the Eucalyptus upon distillation with water yield large quantities of an essential oil. This oil is stored up in the pellucid glands contained in the leaves, and which may be readily observed when they are held up to the light, by the semi-transparent appearance they then exhibit. These oils are now prepared on a large scale, and form an important article of commerce between this country and Australia. They have generally a somewhat camphoraceous smell, but the odour of *Eucalyptus globulus* is by no means agreeable in its concentrated state, while that of *E. citriodora* has a pleasant citron-like odour. Most of the oils as imported have a yellowish colour, although others are somewhat blue; but when redistilled they are all nearly colourless.

These oils have been employed for various purposes; thus, that of the *Eucalyptus oleosa* as a solvent for resins is much used in the preparation of varnishes; but they are also of value for diluting the more delicate essential oils which are used in perfumery. Mr. Rimmel has especially recommended them for this purpose, and specimens of soaps and other substances thus scented are now exhibited. The oils more especially recommended on this account are those of *Eucalyptus amygdalina*, *E. globulus*, and *E. citriodora*.

A recent application of the oil of *Eucalyptus globulus* is also made by Mr. Rimmel, who has introduced what he has termed an "Aromatic Ozonizer," and which he recommends as a *pleasant disinfectant*. It is in the form of a coarse powder, composed of pine-wood sawdust, through which is diffused the oil of eucalyptus, and also the oils of lavender, rosemary, and thyme. The author finds

that it certainly communicates an agreeable freshness and pleasant odour to the air of rooms. It has also been elsewhere stated that an excellent disinfectant may be made by adding from one to four ounces of eucalyptus oil to a bushel of deal sawdust.

Eucalyptus oil has also been used as an external application for similar purposes as that of cajuput oil, but it is far inferior to it in value.

From the quantity of oil contained in the leaves of *Eucalyptus globulus*, they yield, when burned, a very large proportion of gas; and it is stated that one of the towns in the gold regions of Australia was for a long time lighted by gas thus obtained. The oil thus derived is said to produce a very brilliant flame; and as much as 10,000 cubic feet have been obtained from a ton of leaves. But the expense of collecting these leaves in a country where labour is so costly, appears to have proved a barrier to its employment, except under exceptional circumstances.

The oil is by far the most important constituent of the leaves. Its principal constituent was found by Cloez, some years since, to be a colourless liquid, which he regarded as analogous to camphor, and to which he gave the name of *eucalyptol*. This has been recently shown to be a mixture of at least two hydrocarbons, a *terpene* and *cymene*, and an oxidized substance.

It was formerly imagined that Eucalyptus leaves also contained quinine, or some one or more of the other well-known alkaloids of cinchona barks. But the experiments of Broughton entirely disprove this; for upon careful examination of the leaves and likewise of the bark, this chemist states that neither quinine, nor any other of the alkaloids of cinchona barks, as quinidine, cinchonine, or cinchonidine exist in any proportion.

The timber of several species of Eucalyptus is remarkable for its solidity, hardness, and durability; it has also great power in resisting the attacks of insects and the teredo, and the influence of moisture. Moreover, this plant, as recently noticed by Sir Joseph D. Hooker, "seems to be proof against parasitic plants; the bark being deciduous causes the seeds of any parasite to be dislodged before they have time to germinate and so obtain a footing in the tissues of the plant." So that, as Sir Joseph Hooker says, in countries not too hot for its growth, "its timber will probably turn out to be extremely useful." That this plant is not always protected from parasites was shown by the author, who placed before a meeting of the Pharmaceutical Society a piece of the stem of Eucalyptus, from which the parasitic loranthus was growing. The

great length of the planks that may be obtained from this tree is another important element in its favour. Thus, as it commonly does not send out a branch until the trunk is one hundred feet high, in many cases planks of this wood have been cut of one hundred and sixty feet in length, twenty inches broad, and six inches in thickness; and larger planks may be obtained, for in 1855 a plank was prepared for the Paris Exposition, but no vessel could be found capable of conveying it to Europe. These qualities render the timber especially valuable for shipbuilding, railway sleepers, maritime works, and where beams of great span are required, and for numerous other purposes.

Baron von Mueller has also shown that the ashes of the wood of the species *Eucalyptus* contain a very large proportion of potash. Their richness in this respect may be estimated from the fact that while the produce from the ashes of the elm and maple, which are the trees most esteemed for this purpose in America, is estimated at about 10 per cent., the ashes of the eucalyptus yield as much as 21 per cent. of potash.

The barks of various species of Eucalyptus have also been applied to useful purposes. Thus, in the *first place*, they are extensively used for tanning and dyeing; and they owe their value in these respects to the presence of similar constituents to those contained in oak bark and other substances commonly employed for such purposes in this and other countries. *Secondly*, the barks of many species may be used in paper-making. Several specimens of packing and printing papers thus prepared are now exhibited, as also a specimen of writing paper from the bark of one species.

A number of species of Eucalyptus also exude a very astringent substance, which, from its resemblance to the ordinary medicinal kino, is commonly designated as *Australian*, *Botany Bay*, or *eucalyptus kino*. This substance, which, when it first exudes, trickles like blood down the bark of the trees in a semi-fluid state, ultimately hardens into dark red shining masses, which have a very astringent taste. It is employed for similar medicinal purposes as our official kino, and also for tanning, dyeing, and other important purposes.

Another substance called Australian or Eucalyptus manna is also yielded by one or more species of Eucalyptus. This manna is usually in small, rounded, opaque, whitish masses, which have an agreeable sweet taste. In its action it is similar to the ordinary manna used in this country; it contains a peculiar kind of sugar, called *melitose*. It exudes abundantly during the summer months through punctures or wounds made in the leaves and young bark.

As it exudes it hardens, and drops from the leaves on to the ground in pieces which are sometimes as large as an almond.

The author concludes by an allusion to the medicinal properties of the *Eucalyptus globulus*. So many medical practitioners have testified to the febrifugal properties of the leaves, that their value in the treatment of intermittent fever can scarcely be doubted. In Australia also, and in some other districts where the plant has been introduced, the leaves have long had a popular reputation in the treatment of fevers. Their antiperiodic properties are, however, far less manifest than those of cinchona barks, and some of the exaggerated statements that have been made in reference to the efficiency of the leaves appear to have arisen under the mistaken impression of their containing one or more of the alkaloids of cinchona barks. The bark is also said to possess similar properties in this respect to the leaves. Several preparations of both bark and leaves, such as the tincture, fluid extract, syrup, extract, lozenges, pills, and many others, are now exhibited; but the best form of administration is probably the alcoholic tincture. Eucalyptus leaves have been likewise used for their stimulant and antispasmodic properties. The tincture has been especially recommended in bronchitis; and in the form of cigarettes the leaves are now frequently smoked, and are reputed when thus used to be efficacious in asthma, whooping-cough, bronchitis, and other affections.

The preparations of Eucalyptus have also been used with success in other affections; and lately a new method of dressing wounds, by using Eucalyptus leaves instead of lint, has likewise been recommended. The leaves are simply laid on the wounds; and it is said that their balsamic nature not only cures, but also removes all the unpleasant odour.

It should be especially noticed that in making preparations of Eucalyptus leaves, the narrow, somewhat sickle-shaped ones which are obtained from the full-grown tree, should alone be used, as it has been proved that these are more efficacious than the broader leaves which are derived from the young plant.

Another popular use to which this now celebrated plant has lately been applied is to suspend a branch over a restless sleeper, or to place some leaves under the pillow, when it is said to produce sleep.

In consideration of the beauty of the different species, the proved influence of *Eucalyptus globulus* in destroying the pestilential character of marshy districts, and the numerous important economic and medicinal products which the *Eucalypti* yield, the author regards

the genus as one of the most important to man in the vegetable kingdom.

For the history and botany of Eucalyptus, which form the first part of the author's lecture, we refer our readers to the report in the *Pharmaceutical Journal*, 865, 866, and also to his previous essay on this subject, a copious abstract of which will be found in the *Year-Book of Pharmacy*, 1874, 24.

Jurubeba, or Solanum Paniculatum; and Jurubebine, its active Principle. Dr. F. V. Greene. (*Amer. Journ. Pharm.*, 1877, 506.) Jurubeba, which is also known as the *juripeba*, *jupeba*, or *jubeba*, is the *Solanum paniculatum* of Linnæus, and one of the two solana described by Pison (Brazil, 85) under the name of *juripeba*, the other being, according to Dunal (*Dict. Univ. Mat. Méd.*, 1834, vi., 422), the *Solanum toxicarium*, growing in Guiana, and used by the natives as a poison. Spix and Martius state that "the juice of the crushed leaves and fruit of the juripeba is used in obstructions of the abdominal viscera, particularly of the liver, and in vesical catarrh. Several other specimens of solanum are used in like affections, and are applied fresh to the surface, with an ordinarily favourable effect on the cicatrization of wounds and ulcers" (*Journ. de Chem. Méd.*, v., 423, from "Voyage to Brazil"). Merat and De Lens (*Dict. Univ. Mat. Méd.*, vi., 419) refer to the use of the juice of the leaves and fresh fruit of the jurubeba in the Antilles, where it is known as the *croc de chien* and is much esteemed in the treatment of the affections mentioned above. They also state that Pison had used the decoction of the root with decided success in the treatment of dropiscal affections. In his "Herbarium Florae Brasiliensis, Monachii," 1837, 157, Dr. C. T. Ph. de Martius states that the *Solanum paniculatum*, Lin., is the true juripeba of Pison, a drawing of which is given in the latter's work on Brazil (p. 84) and also in Maregraff (p. 89, edit. 1648). He also states that there is a variety with sub entire leaves, which is described in Velloso ("Flor. Flum.," ii., 124) under the name of *Solanum jubeba*, which signifies soft berry, from the words *juia*, berry or fruit, and *beba* or *peba*, soft.

The jurubeba, which is described by Linnæus ("Spec. Plant.," i., 267), by Aublet ("Plant. de Guiane," i., 216), more fully by De Candolle (Pro., xiii., 197), and in the Universal Herbal (edition 1820, ii., 597) of Thomas Green, under the name of the *panicled nightshade*, is a plant with a fruticose and prickly stem; leaves, according to the variety, of which there are two, either cordate sinuate, or lobed or incised; flowers terminal, disposed in panicles, and fruit

a four-celled spherical berry, each cell containing from twelve to fifteen small flattened seeds of a light brown colour, embedded in a semi-transparent juicy pulp; pericarp thin, and of an olive green colour. According to Chernovix ("Formulario," 9th edit., 508) all parts of the plant contain mucilage and a bitter principle. The plant grows in the vicinity of Bahia, at Cape Frio, in the provinces of Pernambuco, Ceara, Mina Geraes, Santa Catherina, and in other places of western Brazil. It flowers in December.

The author received from the Brazilian Commissioners of the Centennial Exhibition a few ounces of the jurubeba berries, and likewise small quantities of the syrup, wine, and plaster of jurubeba prepared at Pernambuco, all of which he submitted to a chemical examination. The crushed berries, together with the spirituous liquid in which they had been preserved, were macerated with alcohol of 75 per cent., the tincture filtered and evaporated to the consistence of a soft extract, and this exhausted with water acidulated with acetic acid. To the filtered solution ammonia was added in slight excess; the greyish precipitate produced was separated by filtration, washed, dissolved in acetic acid, and reprecipitated by ammonia, by which treatment it was rendered nearly white. It was then dissolved in dilute sulphuric acid, and the solution placed over sulphuric acid under a bell-glass. After the evaporation of the liquid, there remained a slightly yellowish mass, composed of prismatic crystals, which on being ignited on platinum foil left a very considerable residue. Further examination of these crystals proved that they were composed of ammonio-phosphate of magnesia, with a small amount of colouring matter.

The filtrate of the precipitate with ammonia was then evaporated to a small bulk, and extracted with distilled water acidulated with acetic acid; the filtered solution was evaporated to a soft extract, treated with sodium bicarbonate in excess, and shaken with ether. The ethereal solution was neutral to test paper. On evaporating the ether, there remained a semi-transparent viscid mass, with a bitter taste and slightly aromatic odour, sparingly soluble in water, but readily soluble in ammonia, alcohol, and chloroform. Sulphuric acid added to a small portion produced a dark red colour, nitric acid gave merely a darker shade of yellow. On adding very dilute hydrochloric acid to the mass, it dissolved, with the exception of a small quantity of a dark resinous substance. The filtered solution gave the following indications of the presence of an alkaloid. With phosphomolybdic acid it produced a yellow precipitate, which was dissolved by ammonia, giving a blue solution that became colourless

on boiling; with sodium phospho-tungstate it gave a white flocculent precipitate; potassio-cadmic iodide also threw down a white precipitate (distinction not only from solania, but from glucosides and neutral substances in general); potassio-mercuric iodide formed with it a yellowish white precipitate, soluble in acetic acid and in excess of the precipitant; with iodine in iodide of potassium solution it gave a yellow precipitate, and with tincture of galls a white precipitate, soluble in acetic acid, insoluble in ammonia. A yellow precipitate was also afforded by auric, but none by platinic chloride. Nitrate of silver and potassio-cupric sulphate gave white precipitates, which were not reduced by heating. Mercuric chloride and perchloride of iron threw down white precipitates. Picric and chromic acids did not yield precipitates.

The preparations of jurubeba (syrup, wine, and plaster) were also examined, and found to give the same indications of an alkaloid as the berries.

Though the quantity of material operated on was too small to admit of the separation of the active principle or its salts in a sufficiently pure state to determine either their precise chemical characters or to investigate their physiological and therapeutic action, the above experiments show conclusively that the principle extracted differs in many respects from the glucoside solanin and the known alkaloids of the solanaceæ. The author proposes the term jurabebine to designate the alkaloid contained in the berries of *Solanum paniculatum*.

The Turpentines and the Resinous Products of the Coniferæ. Dr. G. Morel. (*Pharm. Journ.*, 3rd series, viii., 21, 81, 281, 283, 342, 542, 725, 886, 981, 1024.) In an elaborate and exhaustive essay, which, however, is unsuited for abstraction, the author deals with the following substances :—Strasburg turpentine, Canada balsam, common turpentine, Venice turpentine, Hungarian balsam, Carpathian balsam, turpentine from the Aleppo pine, Burgundy pitch, galipot, pitch, wood tar, juniper tar, oil of turpentine, oil of juniper, oil of savin, oil of cedar, colophony, and sandaraeh.

Note on Grindelia Robusta. E. M. Holmes. (*Pharm. Journ.*, 3rd series, viii., 787.) The observation previously made by Prof. Maisch, that much of the drug sold as *Grindelia robusta* in American commerce belongs to other species (chiefly to *G. squarrosa*), induced the author to examine specimens of the drug as imported into this country, and these too proved to be not *G. robusta* but *G. squarrosa*.

The genus *Grindelia*, according to Asa Gray, is one which is characteristic of the plains west of the Mississippi, extending to the

Pacific coast and to Mexico, with two or three species in similar regions in South America. They, are, however, most abundant in Mexico and Texas. The chief distinguishing character of the genus lies in the pappus, which consists of from two to eight rigid awns that a touch is almost sufficient to break off, and which in fact fall off early.

The species are very intricate, and run so much into each other through a variety of forms, that it is difficult to define any good character by which the species may be distinguished. Those which have been chiefly relied on in describing these plants have been the shape and serration of the leaves, the character of the scales of the involucre, and the number of the awns of the pappus. The latter character is, however, of little practical value, since the number is variable in the same species, and the flower heads are usually so resinous that it is difficult to examine a dried specimen without the pappus falling off.

The species which seem to possess this resinous matter, upon which it may be presumed the active properties of the plant depend, and which are most likely to be met with in commerce, are—*G. squarrosa*, Dunal.; *G. rubricaulis*, Dec.; *G. robusta*, Natt.; *G. integrifolia*, Dec.; *G. inuloides*, Willd.; and *G. glutinosa*, Dunal. For pharmaceutical purposes these may be roughly distinguished as follows: *G. squarrosa* has leaves which are narrowly lanceolate, tapering downwards to a small cordate base, so that the upper portion of the leaf is the broadest, and the scales of the involucre are subulate, and strongly curled backwards. In *G. robusta* the leaves are oblong, broadest at the base, nearly twice the width of *G. squarrosa*, and obtuse at the apex; the scales of the involucre are similar to those of *G. squarrosa*, but are less squarrose. *G. integrifolia* has the leaves entire or very sparingly serrated, with the leaves longer and more tapering at the apex than those of *G. robusta*, which it otherwise resembles. *G. inuloides* is a very well marked species, the flower heads being almost immersed in large leafy bracts, so that they have a sessile appearance; the leaves are nearly as broad as those of *G. robusta*, oblong, and much wider near the base, and are furnished with short, closely set teeth, which are more obtuse than in the other species. *G. glutinosa* has lanceolate leaves, broader than those of *G. squarrosa*, also tapering to the base, but the scales of the involucre are linear, with a short point, and are not bent backwards but erect. *G. rubricaulis* is easily distinguished by the hairiness of the involucre and purplish stem, and by the uppermost leaves being larger at the base, while the lower leaves taper towards the stem.

It is this last species which, under the name of *G. hirsutula*, is mentioned in Wood and Bache's "Dispensatory," as a remedy for the irritation caused by the poison of *Rhus toxicodendron*.

The amount of resin developed in the plants appears to vary according to the situation in which the plant grows; those which are found in hot, dry places being apparently most resinous.

Although it is probable that the resin does not differ in properties in the various species, it is at least satisfactory to know that although the one to be met with in commerce in this country is not *G. robusta*, it is quite equal to that species in the amount of resin it contains, and indeed appears to be one of the richest in medicinal properties of the whole genus.

French Lactucarium. (*New Remedies*, from *La Ruche Pharm.*, 1877, 21.) The principal if not the sole producer of lactucarium in France is M. Aubergier, of Clermond-Ferrand, in Auvergne, Department Puy-de-Dôme, whose researches on the chemistry and therapeutics of this drug are well known to pharmacists. His first experiments, which were made previous to 1841, were chiefly directed to the selection of the proper variety of lettuce, so as to obtain the largest possible yield of lactucarium. As a result of his investigations he began the cultivation of *Lactuca altissima*, Bieb., a native of the Caucasus, which is a gigantic herb (hence called *laitue gigantesque*), having when cultivated a height of 9 feet, and a stem $1\frac{1}{2}$ inches in diameter. The manner of collecting the juice differs from that pursued in Germany or Scotland; instead of cutting off the stem near the top and removing successive slices every day, transverse incisions are daily made at the time of flowering, into the stem from above downward, and the juice which flows from them is collected in a glass vessel. By the time this is full, the juice has coagulated and is removed, after which it is shaped into circular cakes of $1\frac{1}{2}$ inches in diameter, which are dried by exposure to the air upon sieves.

While it was found, in the commencement of the enterprise, that one person could collect at most 60 grams of the juice per day, M. Aubergier has succeeded in training his employés—and he employs only women for this purpose—so well, that the mean daily quantity collected by one person now amounts to about 600 grams (about 1 lb. 5 oz.), while some very active workers occasionally gather as much as one kilogram. This activity and skill is stimulated by premiums, which are given for any quantity returned above 300 grams, and further by a sort of co-operative partnership, the most expert workers receiving at the end of the

season some extra gratuities proportionate with the total yield Dry seasons are very unfavourable to a large yield; and in order to be able to supply the demand, M. Aubergier takes advantage of moist seasons to lay in a large supply, sufficient to last for several years ahead.

The Alleged Antagonism between Nicotine and Strychnine. Dr. F. L. Haynes. (*Amer. Med. Journ.*, from *Pacific Med. and Surg. Journ.*, Nov., 1877.) The author's experiments lead to the following conclusions:—

1. Strychnine and nicotine are in no degree antagonistic poisons.

2. Strychnine increases the convulsive action, and does not diminish the motor paralysis of nicotine.

3. Nicotine (even in paralysing doses) increases the convulsive action of strychnine.

4. Both poisons cause death by paralysing the respiratory apparatus. They may affect respiration in different ways, but the result is the same.

5. Animals may be killed by injecting together doses of the two drugs, which singly are not fatal.

Bitter Almonds. L. Portes. (*Comptes Rendus*, lxxxv., 81.) The physiological investigations of the author led to the following results:—1. Bitter almonds during development contain amygdalin. 2. Their composition always differs from that of sweet almonds. 3. The embryo contains the emulsin. 4. The amygdalin, whose origin is still unknown, appears first in the integuments of the seeds, and passes gradually through the radicle into the cotyledons.

Rheum Officinale. E. M. Holmes. (*Pharm. Journ.*, 3rd series, viii., 181.) A careful examination of the root of *Rheum officinale* has enabled the author to clear up the doubts as to the identity in structure of this root and the true Russian rhubarb. A plant three years old was dug up, and found to present the following features:—

The sympodium or cluster of root-stocks differs from that of *Rheum rhaponticum* in its great size, and in the root forming a tuft at the base of the root-stocks, and not springing from their sides. When the root-stocks were trimmed by depriving them of the roots and small lateral shoots, they weighed on the average about $8\frac{1}{4}$ lbs., the central one being about 10 lbs. The root-stocks were nearly cylindrical in shape, tapering very slightly to either end, and about 6 inches in diameter in the middle, and from 15 to 18 inches long. The roots on the average were $1\frac{1}{2}$ to 2 inches in diameter near their attachment to the root-stock, and tapering downwards. The root-

stocks of some *Rheum rhaponticum* of eleven years' growth, which was lying near, were not more than a quarter the size.

When the outer portion was carefully sliced off in different parts of the root-stock and root, it *nowhere* presented the appearance characteristic of the true Russian rhubarb. The cortical portion was then removed in several places (this being always absent in Russian rhubarb), and the meditullium or central portion sliced in like manner, but no trace of the network which so markedly distinguishes the Russian rhubarb could be seen. These marks are well represented in *Goebel and Kunze*, pt. ii., tab. I., fig. 2b.

The transverse section of the root-stock also is not so finely grained; and although it is marked with many stellate spots, the markings are much larger and bolder than those of Russian rhubarb, and, in fact, approach more nearly to the markings on English rhubarb. The sections of the true roots present only a radiate structure without any stellate markings. In the author's opinion the Russian root is produced by a plant which has much less rapid growth than the noble *Rheum officinale*, Baill.

From the English rhubarb the root-stock differs chiefly in its paler colour, much larger size, and in the abundance of large stellate markings. As regards its medicinal properties there is reason to believe that it is much stronger than the English kind, and probably equal to the East Indian. It will most likely soon be tried at two of the London hospitals; and a report upon its action will doubtless follow in due course and awaken considerable interest.

Physiological Effects of Coca. E. B. Shuttleworth. (*Canadian Pharm. Journ.*, August, 1877.) All authorities agree that coca is a most powerful drug, and that for ages it has proved to the native Indian tribes an incalculable blessing. At the present time, in South America, the annual consumption of the leaves cannot fall short of 100,000,000 pounds—a fact in itself sufficiently suggestive and conclusive.

Of the effect of coca on English-speaking people in Europe and America, the evidence is not so satisfactory. Some experiments have been made and reported, in which the drug has apparently fulfilled the expectations which were entertained regarding it; while, on the other hand, it has as often been condemned as useless, and, perhaps, inert. The statements of Sir Robert Christison, as given in his address before the Botanical Society of Edinburgh, may be taken as representing one side of the case; those of Weston, the pedestrian, the other. In both the evidence is strong but contradictory.

The author has had numerous opportunities of studying the physiological action of coca, and states that in the majority of cases which came under his observation its power of preventing fatigue was well established. He arrives at the conclusion that this drug may be classed in the same category with tea and coffee, but that its effects are more strongly marked. This view has also been advanced by Dr. Pigeaux, of Paris, who made many experiments with fresh leaves submitted to him by the Society of Acclimatization. He, however, observes that he found it less exciting to the nerves than either tea or coffee, but its action over the heart is twice that of the latter, and four times that of the former. Mons. Colpaert says that the brain is also affected. Persons using coca for a great length of time, and in excess, are ultimately reduced to a complete state of mental imbecility or idoicy.

In South America particular care is taken to procure the leaves in as fresh a state as possible, and many writers have ascribed the want of effect to the use of old leaves.

The author has no doubt that coca deteriorates by age, as will also tea and most medicinal leaves; but he is certain that it does not become wholly inert, if preserved with care. The author has in his possession a quantity of coca, which is, at least, eight years old, and it will still produce its characteristic effect. The leaves used by the lacrosse players in the experiments described in the author's report were as fresh as they could be obtained in New York, where the price is about two dollars a pound. The details of these experiments will be found in the source quoted above, and also in the *Pharmaceutical Journal*, Sept. 22nd, 1877, 222.

Aspidium Marginale. C. H. Cressler. (*Amer. Journ. Pharm.*, 1878, 291.) The author reports several trials with an oleo-resin, prepared from the rhizome of *Aspidium marginale*, the results of which appear to prove that this plant is as efficacious a remedy for tapeworm as the true male fern. His observations are important to the medical practitioners and pharmacists of the United States, where *Aspidium Filix mas* is comparatively scarce, whereas *Aspidium marginale* is found in great abundance.

Euphorbia Lathyrus. O. Zander. (*Archiv der Pharmacie*, 1878, 211.) The seeds of this plant, which are also known by the name *semina cataputiae minoris*, yield, upon treatment with bisulphide of carbon, 42 per cent. of a fatty oil, which has a very irritating effect on the skin; and might, in the author's opinion, be employed as an external irritant in the place of the more expensive croton oil. The internal administration of a few drops of this oil

in water produced a strong purgative effect, preceded by nausea and vomiting, accompanied by a burning sensation in the throat.

Note on the Distribution of the Cinchona Alkaloids in Cinchona Trees. D. Howard. (*Pharm. Journ.*, 3rd series, viii., 1.) The author has previously called attention to the presence of quinidine in the renewed bark of *Cinchona succirubra* and *Cinchona officinalis*, and in the root bark of the latter in much greater quantities than in the natural stem bark (see *Year-Book of Pharmacy*, 1875, 160). Since that time he has had many opportunities of confirming those observations, the renewed bark of both species invariably showing a greatly increased percentage of this alkaloid. He finds, however, that by very careful testing of considerable quantities of the alkaloid from *Cinchona succirubra*, it is possible to obtain quinidine in proportions varying from a minute trace to ·06 per cent. of the bark in that from Ootacamund, Darjeeling, and Java.

Recent importations of the root bark of *C. succirubra* and *C. officinalis* from Darjeeling, and of *C. succirubra*, *C. Ledgeriana*, and *C. Hasskarliana* from Java, have given an opportunity to extend our knowledge of root bark. The specimens from Darjeeling are of special value, as the root, stem, and branch bark sent over together may safely be taken as representing the produce of the same trees; whereas there is no information as to which of the various parcels of stem bark sent from Java, the small quantities of root bark sent with them belong.

An examination of the root bark from Darjeeling shows a very high percentage of alkaloids,—which is in all cases much greater than that given by the stem bark of the same trees, usually in the proportion of about eight to five,—and a great difference in the proportion of the different alkaloids in the stem and the root.

In all the specimens the author has examined of the *C. succirubra*, the great increase is in the dextrogyrate alkaloids quinidine and cinchonine, and to a small extent in the slightly dextrogyrate amorphous alkaloid. The percentage of quinine and cinchonidine in the bark averages slightly less in the root than in the stem, but more than in the branches; but the total variation in these alkaloids between the stem and the root of the same tree is much less than between different samples of either from different plantations. The percentage of cinchonine, on the other hand, seems invariably in the root bark from twice to three times as great as that in the stem bark; and that of quinidine is increased from a minute quantity to ·2 to ·3 per cent.

The increase of the amorphous alkaloids is much smaller, being

usually in the proportion of eleven to ten. A comparison with the quill bark from the smaller branches shows even more decidedly this difference in the distribution of alkaloids. Not only is the total quantity of alkaloids much less than in the stem bark, but the proportion of the dextrogyrate alkaloids is distinctly less. The composition of the alkaloid in the root fibre shows an even higher percentage of quinidine than that of the root bark. It is impossible to separate the bark from the wood in these small roots, which are from the thickness of a quill to a mere fibre, and therefore impossible also to give the percentage of alkaloids in the bark without the woody portion.

Total Alkaloid Composed of:—	Branch, 3·3	Stem, 5·5	Root, 7·6	Root Fibres, 2·0
Quinine . . .	23·5	20·2	11·5	13·0
Quinidine . . .	·6	·6	2·9	11·4
Cinchonidine . .	25·3	23·6	19·9	11·7
Cinchonine . .	19·4	32·8	47·3	46·7
Amorphous . .	31·2	22·8	18·4	17·2

The crown bark from Darjeeling is interesting, both in its resemblance to and difference from the red bark. This species has not flourished there; a large proportion of the trees died, and those that survived were stunted and weakly. The stem bark is of fair quality, though far inferior to that grown at Ootacamund, yielding 3 to 4 per cent. of alkaloid, of which 60 per cent. is quinine, with small quantities of quinidine and cinchonine. The root bark contains about twice as much total alkaloid, of which 50 per cent. is quinine, 9 per cent. quinidine, 9 per cent. cinchonidine, and 16 per cent. cinchonine; the increase in the quinidine and cinchonine being even more marked than in the case of the *succirubra*.

The root barks from Java of the *Cinchona succirubra*, *C. Ledgeriana*, and *C. Hasskarliana*, all show the same tendency to the development of the dextrogyrate alkaloids. It is not stated what stem bark belongs to the root bark sent over, but it is interesting to observe that in each case the root bark contains more of these alkaloids than any single specimen of stem bark of the same species, and greatly more than the average.

Thus in the *C. Ledgeriana* the increase of alkaloid in the root is very slight; but the proportion of quinidine is doubled, and of cinchonine trebled, the amorphous alkaloid being also increased.

In the *C. Hasskarliana* the total alkaloid is decidedly increased, the proportionate increase of the dextrogyrate alkaloids being similar to

that in the *C. Ledgeriana*. In both these species the quantity yielded of these alkaloids is but small, but the marked increase is not less interesting on that account. In the *C. succirubra*, also, the increased quantity of alkaloid in the root is chiefly cinchonine, the quinidine increasing from ·01 to ·05 per cent.

There has been no opportunity of comparing the root bark of the cinchonas from Ootacamund, for the great success which has attended the system of renewing the bark puts the destruction of the trees out of the question; but it is interesting to observe that the specimen of root bark from *C. officinalis* from this district, which the author described in 1875, shows an increase in the dextrogyrate alkaloids equal to that in the *C. officinalis* from Darjeeling; there is also an increase in the quinine, but much less than in the Darjeeling bark.

In the case of root and stem bark from the Wynaad district, the total alkaloid is increased from 5·0 per cent. to 6·5 per cent., the quinine being diminished and the cinchonidine increased; but as might be expected, the cinchonine is increased from 2·2 per cent. to 2·8 per cent., and the quinidine from a trace to ·3 per cent.

It seems, therefore, that there is an invariable tendency in the bark of the root of the various species of cinchona to produce the dextrogyrate alkaloids in greatly increased proportions; and this is the more noteworthy as the production of the lævogyrate alkaloids in the root bark varies exceedingly, according to the species and habitat, being sometimes greater and sometimes less than that in the stem bark of the same trees.

The same tendency is shown in a much slighter degree by a comparison of the bark of the branches with that of the large stems, the proportion of the cinchonine and quinidine increasing as we approach the root more rapidly than that of the quinine and cinchonidine; but it is not till we reach the root that we see the sudden and well-marked change in proportion of the alkaloids that we have been considering.

The constitution of the alkaloids of the renewed bark affords curious points, both of resemblance and contrast, to that of the root.

There is seen in the renewed bark also an increased yield of alkaloids, but in this case the increase of the more oxidized alkaloids, —quinine and its isomers,—is accompanied by a distinct diminution of cinchonine and cinchonidine.

This is most evident in the *C. succirubra*, the proportion of quinine and cinchonidine being inverted by the process, while the slight diminution of the cinchonine is accompanied by an increase of the

quinidine from ·03 per cent. to ·14 per cent.; but the same change takes place in the bark of the *C. officinalis*, where the cinchonidine almost disappears, and the quinidine is markedly increased in quantity, the amorphous alkaloid being in each species increased by the process.

The renewing of the bark has only been carried on as yet on the Neilgherries; but it is to be hoped that the great commercial success which has attended the experiment will lead to its adoption, if practicable, elsewhere, when we shall see if the modification of the alkaloid follows the same rule under all circumstances.

The variations shown by the *C. succirubra*, under the influence of climate and soil, are also very interesting. This species of cinchona alone seems to be sufficiently hardy to adapt itself to varied circumstances,—growing alike at Darjeeling, where the other species have proved almost total failures; in the Neilgherries, where the climate seems the best suited for the *C. officinalis;* and in Java, in the habitat so singularly favourable to the *C. Ledgeriana*.

The proportion of the alkaloids varies, however, very distinctly under these varied circumstances. Except under the artificial treatment of renewing the bark, it is never rich in quinine; but the cinchonidine and cinchonine show very interesting variations.

In Java the cinchonidine predominates in a most marked degree. On the Neilgherries, though cinchonidine is still predominant, cinchonine shows an increase. On the Himalayas the bark shows a diminished yield of cinchonidine, but a marked increase of cinchonine and amorphous alkaloid.

Not having been able to get particulars of the various elevations at which bark is grown at Ceylon, the author does not speak with certainty as to the different specimens obtained from that island; but thinks that the bark from the lower elevations approximates nearly to that from Darjeeling, while the higher plantations give bark of similar characteristics to that from Ootacamund.

All these considerations point out the great care that should be exercised to choose suitable situations for cinchona plantations, as well as the importance of selecting the best species for cultivation. The experience of the plantations in Java shows that under the most favourable circumstances the wrong tree will not produce rich bark, and that of Darjeeling plantations shows that the right tree in the wrong situation will either dwindle away or produce a distinctly inferior bark.

The results of cinchona cultivation at Darjeeling thus agrees with the experience earned in some districts of South America, somewhat

similarly situated in too damp a climate at too low an elevation. There also instead of the calisaya and micrantha barks, rich in quinine of the higher slopes, we find what are either degenerate varieties or different species, in which cinchonine, and in some cases quinidine, take the place of quinine.

A vast proportion of the "flat yellow bark" now imported is from these regions, and though certainly flat and yellow, resembles in little else the flat calisaya bark of a few years back, and must certainly lead to disappointment if substituted in medicine for the true calisaya.

The Action of Cicuta Virosa and some other Poisonous Plants. (*The Practitioner*, Sept., 1877.) The most poisonous part of the plant, according to Trojanowski, is the root. The ethereal oil contained in this has no poisonous action, but the activity appears to reside in certain bright yellow drops contained in the resinous cortical zone, and from this a homogeneous, tenacious, non-drying, amorphous, highly poisonous, resinous material can be obtained. Two or three milligrams are sufficient to poison a frog, and a cat is killed by the intra-venous injection of ·007 of a gram. It is proposed to name it "cicutoxin." It is absorbed slowly, the symptoms only appearing after twenty minutes, and sometimes not till after the lapse of several hours. The mode in which it gains entrance into the blood when ingested is not clear, since it is insoluble in water. In medico-legal cases, where no part of the structural elements of the plant can be discovered, it may still be possible to obtain sufficient of the resin by macerating the stomach in ether to make a physiological experiment on a frog. The actions of cicutoxin are remarkably similar to those of picrotoxin (from the *Anamirta cocculus*), of coriamyrtin (from *Coriaria myrtifolia*), of the resin of digitalis and taxus, and those of the baryta salts. These collectively form the so-called group of convulsive poisons. They act as violent excitants of a limited region of the medulla oblongata, near the apex of the calamis scriptorius of the convulsive centre discovered by Heubel in the frog, the existence of which has also been demonstrated by Nothnagel in mammals, and also to some extent to all the other centres situated in the medulla oblongata. The general symptoms produced by these poisons are well shown by the injection of a small quantity of cicutoxin beneath the skin of a frog. After twenty minutes, the hind legs become stiff, the thighs are thrust out at right angles to the body, and the toes separated. The respiratory movements are much accelerated (irritation of the vagus centre), and owing to the inspiratory acts

preponderating over the respiratory, the abdomen is blown up; whilst in consequence of the convulsive contraction of the abdominal muscles, the air is forcibly driven through the contracted glottis with a very characteristic shriek. Tonic-clonic contractions of the muscles generally now supervene, the respiration is arrested, the movements of the heart are retarded, and death occurs with general paralysis after some hours or days. In mammals, after a period of restlessness of variable duration, and abundant flow of saliva, the respiratory movements become more rapid and deep, and soon the most violent tonic and clonic convulsions of the voluntary muscles set in, during which respiration is stopped by tetanus of the diaphragm, the cardiac beats are rendered much more energetic, and in the height of the attack are, with the circulation, brought to a standstill. The urine and fæces are expelled with convulsive violence. The attack occurs with increased frequency, and the animal dies exhausted from inadequate respiration. During the whole period, the reflex excitability is enormously increased. Dr. Planat has suggested the employment of picrotoxin in the treatment of epilepsy. He commences with small doses, and gradually increases them. In twenty-two cases thus treated, more or less complete cures were effected.

Garrya Fremonti. D. W. Ross. (Abstracted from an Inaugural Essay. *Amer. Journ. Pharm.*, December, 1877.) Having obtained from Professor Maisch a small quantity of the branches and root of the above plant, the author endeavoured to procure a larger supply from California, but without success; his experiments were therefore not as satisfactory as he could have wished, but he nevertheless succeeded in isolating a bitter principle, which from the tests seems to be an alkaloid, for which he proposes the name "garryina." It was obtained by the following process:—Two troy ounces of the dried leaves were exhausted with alcohol, and about two pints of a dark green tincture obtained. It was concentrated to about two fluid ounces, and an equal bulk of water was added, which precipitated the resinous matter. The filtrate had a dark brown colour, a very bitter taste, and an acid reaction to litmus paper. The precipitated resin, when washed with water until tasteless, was of a light yellow colour. Part of the filtrate was acidulated with muriatic acid and iodo-hydrargyrate of potassium added, which gave a white precipitate. Ammonia water added in excess changed the colour to a dark greenish yellow. Petroleum benzin or ether, agitated with the solution, did not extract any of the bitterness. Chloroform was agitated with the ammoniacal solution in six

separate portions, being allowed to remain in contact each time for twenty-four hours, with frequent agitation, then separated and evaporated spontaneously; a light brown very bitter substance was left, having an alkaline reaction, and being soluble in alcohol, slightly in water. It was dissolved in water acidulated with muriatic acid, digested with animal charcoal, and filtered. The filtrate was very bitter; after being evaporated over a water bath and set aside for a few days, a few cubical crystals were obtained, which had a bitter taste, were soluble in alcohol and water, and gave the following reactions:—With sulphuric acid, after a few minutes, a purple colour; with chromate of potassium and sulphuric acid, first a red, then a yellow, and lastly a green colour. Its aqueous solution was precipitated by iodo-hydrargyrate of potassium.

Besides the garryina, the leaves contain resin, chlorophyll, tannin, and sugar. They yielded 5 per cent. of ash, containing salts of potassium, calcium, iron, and magnesium. The root contains the same alkaloid, answering to the same tests, and obtainable by the same process, except that digestion with alcohol was found to be advantageous. The root contains also resin, starch, and sugar, and yielded $2\frac{1}{2}$ per cent. of ash, in which the same bases were found as in the ash of the leaves.

Viburnum Prunifolium. Dr. E. W. Jenks. (*Chic. Med. Journ. and Exam.*, October, 1877.) This remedy, used by the author almost daily for several years, warrants him in speaking confidently in regard to results obtained from its use. Its most frequent use has been as a prophylactic against abortion. Of course the remedy is worthless when the abortion has already begun by detachment of the ovum. Where the habit of abortion has been formed, the viburnum may be given in the form of the fluid extract from a half teaspoonful to a teaspoonful, four times a day, beginning two days before the regular menstrual date, and continuing it two days longer than the usual menstrual flow. In dysmenorrhœa with profuse menstruation and pain, except when the pain is due to stenosis or mechanical obstruction, viburnum affords the patient great relief. The remedy should be given for several days in advance of the period, as well as during the time of the flow.

In spasmodic or neuralgic dysmenorrhœa it is not sufficient alone to give relief, but may be given with advantage combined with sedatives and antispasmodic remedies, such as cannabis Indica, camphor, hyoscyamus, and conium. In that form of dysmenorrhœa with menorrhagia, caused by fibroid growths, it has been given in combination with ergot, with gratifying results. The author would

designate viburnum prunifolium as a uterine sedative, whose action is as pronounced as is that of ergot in causing uterine contraction.

The form of the viburnum used is the fluid extract made from the bark of the root, and bark of young shrubs, and newly-grown twigs. The dose is a half dram to a dram, repeated every two to six hours.

Curara, the proposed Remedy for Rabies. J. Moss. (*Pharm. Journ.*, 3rd series, viii., 421.) Curara is the name of a poison used by all the South American savages between the Amazon and the Orinoco to arm the points of their arrows. Most authorities say that it is made by the Maconshi Indians, but the Acaway tribe is also mentioned. It consists mainly of the juice or an extract of *Strychnos toxifera*. The first part of the author's paper contains an interesting summary of the history, description, and preparation of curara, which we recommend to the attention of our readers. Here we confine ourselves to the reproduction of the greater portion of those parts which deal with the chemistry, microscopy, and pharmacy of this substance.

Active Principle.—The supposition entertained some time ago that the poisonous properties of curara were due to the presence of strychnia was doubtless based upon the fact that curara contains a body which greatly resembles strychnia in its chemical behaviour, notably in its reaction with chromic acid. It is remarkable that such a supposition should be entertained in face of the fact that curara does not produce poisonous effects when administered by the mouth in quantities which have been known to produce death when introduced directly into the circulation. So far from containing strychnia, Vella (*Pharm. Journ.*, 2nd series, ii., 213), has shown that each is an antidote to the other.

Roulm and Boussingault (*Ann. Ch. Phys.* [2], xxxix., 24, 1828) were the first to attribute the poisonous action of curara to *curarine*. They obtained the latter as an amorphous, horny mass of a yellowish colour. Preyer (*Bull. Soc. Chim.* [2], iv., 238, 1865) was the first to isolate curarine in the crystalline form; according to him it has the formula $C_{10}H_{15}N$. It is very hygroscopic; has a very bitter taste; crystallizes in colourless four-sided prisms; dissolves freely in water and alcohol, less easily in chloroform and amyl-alcohol; and is insoluble in anhydrous ether, benzol, turpentine, and carbon disulphide. It blues litmus very slightly, acquires a splendid and permanent blue colour in contact with sulphuric acid, purple-red with nitric acid, and violet with potassium dichromate and sulphuric acid (like that of strychnia, but more permanent). Its hydro-

chloride, nitrate, sulphate, and acetate, are crystallizable. Dragendorff (*Zeitschrift für Chem.* [2], iii., 28) also finds that curarine is quite distinct from strychnine, and that a very active curara occurs in commerce in which neither strychnine nor brucine can be detected. His "Manual de Toxicologie" contains an excellent chapter on curarine.

If Taylor's ("On Poisons," 3rd edition, 787) statement that the properties of curara are due to the presence of this alkaloid be accepted, it explains and supports Hancock's statement that the most efficient poison is prepared from the wourari vine alone; for it will be observed that in the modes of preparation, either the wourari vine alone is used, or it is mentioned as the chief ingredient,—the additional ones spoken of being used for superstitious reasons, or others more useful. For example, the juice of the bulbous plants of Waterton, or the slimy barks of Hancock, would give adhesiveness to the poisonous extract, and so prevent it rubbing or chipping off the arrow heads before they were required for use, and the pepper would have a certain antiseptic value. In Forsyth's account, the phrase, to "strengthen the former" should be understood rather in the sense of "to give it consistency" than that of "to increase its lethal power," for it is not conceivable that a poison owing its properties to a definite alkaloidal principle whose salts have the same power, could be rendered more poisonous by the addition of any substance which would not of itself be weakened by the admixture. In the account first obtained by Dr. Hancock, the mother-plant of the poison is called *maracuri*. This is probably only another name for the wourari vine in a different locality; for from the description given by Dr. Hancock, it may be concluded to be one of the *cucurbitaceæ*, a family which includes many climbers. Even if the names refer to the same plant, that fact would not preclude the possibility of curarine existing in other species of the same order, whichever they may be.

Microscopical Examination.—None of the students of curara appear to have submitted it to microscopical examination with a view to testing the statements relative to the addition of pepper and other matters possessing organized structure, such as barks, fangs, or ants. The author's experiments in this direction, though very incomplete, are not without a certain interest. A minute fragment of curara corresponding to the description already given was placed with a drop of alcohol (not the best solvent of curarine) on a slide, and well crushed by pressure on the cover. The central mass of curara was seen to be of a rich brown colour, and copiously studded

with quadrilateral prisms. Outside this were numerous isolated crystals of the same shape, from which the cementing material had been dissolved by the alcohol leaving them colourless. Scattered with tolerable evenness over the field were myriads of dusty particles, having a faint tinge of yellow, and moving freely when the slide was rotated. The particles were subsequently found to be oxalate of calcium; the crystals were taken to be curarine. The cementing material was apparently amorphous.

Some curara which had been treated with water till it imparted only a faint tinge to the menstruum was, after drying, placed in a very dilute solution of potash, warmed and filtered. Some of the residue in the filter was placed on a glass slide, and examined with water under the microscope; it resembled the dusty material previously seen. The filter was washed with acetic acid; oxalate of ammonium, when added to the washings, produced no change, nor did the washings give a yellow precipitate with nitric acid solution of molybdate of ammonium. Phosphate of calcium was therefore absent. The filter was further washed with very dilute hydrochloric acid, and the washings similarly tested with oxalate of ammonium, when a copious precipitate was at once obtained. The matter insoluble in potash and in acetic acid was thus found to consist chiefly of calcium of oxalate; the proportion of this to the entire quantity of curara originally employed was such as to lead to the conclusion that either the stem or root used in the preparation of the poison was of no great thickness, or the bark was chiefly used in the preparation. The hydrochloric acid washings also were tested for phosphates; the result was negative, and it was therefore concluded that no bony material, such as serpents' fangs, could have been present in the curara. What remained after treatment with hydrochloric acid was so minute that it was regarded as of no account. The results of the examination are such as favour the opinion that curara, as now met with, is an aqueous extract of a bark, root, or stem.

Solution of Curara for Hypodermic Injection.—The properties of curara preclude its medicinal use in any other form than that of a solution for hypodermic injection. For such a solution to be ready for use at all times, certain characteristics are essential, or at least highly desirable. It must be of convenient strength, so that the dose fixed upon may bear a simple relation to the number of minims, yet not so strong that the injection of a quantity slightly in excess of what was intended may be of too great importance, and not so diluted that the maximum dose is inconveniently large. The solu-

tion should produce as little pain as possible when injected; having regard to the fact that rabies patients have an intensified dread of pain, this characteristic is, perhaps, more important in the particular solution now under consideration than in any other. The solution should not only be at all times prepared of the strength that it professes to be, but should keep well and remain of that strength. To prepare a uniform solution of a drug so deadly and various as curara, one should always have recourse to the same parcel, of which the strength has been proved. Curarine or one of its salts might be used; but independently of the grave risks incurred in preparing them, we are as yet without trustworthy data upon which to frame a formula.

The keeping powers of a solution will depend in great measure on the menstruum. Water would produce a solution giving the minimum of pain when injected, and Taylor's statement that Bernard preserved curara in solution in water for two years without any loss of its power is confirmed by the experience of Dr. Lauder Brunton, who informed the author that he had kept a very weak solution (1 in 1000) for the same period without change. The author has prepared solutions of curara in the following menstrua: viz., water, water with 0·2 per cent. of salicylic acid, diluted spirit of wine (1 to 3), and diluted glycerin (1 to 3). The last forms by far the best looking solution, and is also the best solvent. It dissolves 85·2 per cent. of the curara when left in contact with it for twenty-four hours and filtered; the dried residue hardly imparts any tinge to water. Water dissolves 83 per cent., and diluted spirit 79 per cent. of curara, and the dried residue in each case gives a decided tinge to water; both solutions are iridescent on the surface and at the side when examined in a glass vessel, and commence to deposit soon after being filtered. The glycerin solution deposits to a much smaller extent.

It appears, however, from observations recently communicated to the author by Dr. Ashburton Thompson, that even so weak a solution of glycerin as that indicated above, viz., 25 per cent., is productive of great pain when injected; and seeing that the aqueous solution keeps very well, the author proposes the following formula as best meeting the requirements of the case:—

Hypodermic Injection of Curara.

Curara.	gr. j.
Water	min. xij.

Dissolve; let the solution stand for forty-eight hours, and filter.

Using this solution two-thirds, a half, third, or quarter of a grain may be given in a whole number of minims. Of the other strengths likely to suggest themselves, viz., one in ten and one in fifteen, the first would only allow of a tenth, and half a grain; and the second of a fifteenth, a third, and two-thirds of a grain being given in the same way.

The accounts of the use of curara seem to indicate that the dose is from a quarter to half a grain.

CAUTION.—Curara requires to be handled with the utmost care. It should not be allowed to come in contact with a fresh cut or scratch. Two good rules would be—never to powder it in the dry condition, and never to touch it with the naked fingers.

The Active Constituents of Ergot. P. H. Dilg. (*Amer. Journ. Pharm.*, 1878, 335.) Ergot has been frequently the subject of investigation previous to the discovery, by Wenzell, of the alkaloids ergotina and ecbolina, to the last of which the effects of ergot were supposed to be due (*Amer. Journ. Pharm.*, xxxvi., 193, 1864). Since then the author, in 1872, has published a modified process for obtaining his alkaloids, and a host of other investigators have made known their results. The most recent publications are two interesting and exhaustive papers, throwing much light upon the hitherto somewhat obscure and rather complicated literature of ergot, viz., "Ueber die wirksamen und einige andere Bestandtheile des Mutterkorns" (on the active and some other constituents of ergot), by Dragendorff and Podwissotzky, reprint from the "Archiv für experim. Pathol. and Pharmacol," vi., 1876, and an inaugural essay for the degree of "Master of Pharmacy," by Theo. Blumberg, entitled "Ein Beitrag, zur kenntniss der Mutterkorn-Aekaloide" (a contribution to the knowledge of the ergot alkaloids), Dorpat, 1878. The following is a brief summary of what appears to the author to be the principal results obtained by these writers with the most important constituents of ergot.

Though long known that ergot yields its active principle to cold water, its precise nature has for many years been a subject of continued controversy. It is principally due to the united efforts of Professor Dragendorff and von Podwissatzky, of the Pharmaceutical Institute of the University of Dorpat, that it has now been proven that the most active constituent is an acid termed *sclerotic acid*, which is present in combination with K, Na, and Ca, which salts are freely soluble in water. It is, however, rivalled in action, both qualitatively and quantitatively, by a colloidal substance, *scleromucin*, which is obtained in connection with the acid in the following manner:

Digest ergot, previously exhausted by ether and absolute alcohol, with water, dialyse, evaporate the dialysate to a syrupy consistence, and treat with sufficient alcohol to obtain a mixture containing 40 to 45 per cent. alcohol, which precipitates the potassium phosphate; while more alcohol added until the strength is increased to 75 or 80 per cent. precipitates the salts of sclerotic acid, which are soluble in dilute, but insoluble in stronger alcohol, and leave about 19 per cent. of ash.

The filtrate, upon which alcohol has no further effect, produces with ether a slight precipitate, which after a few days' standing forms a syrupy brown mass, which has scarcely any medicinal virtue. The filtrate from this precipitate, in which the reactions still distinctly indicate the presence of Wenzell's alkaloids after evaporating the ether and alcohol, does *not* produce the specific action of ergot.

The dark liquid remaining on the dialysator, when mixed with sufficient alcohol to bring it to 45–50 per cent., precipitates the *scleromucin,* which while moist forms a mucilaginous solution with water, but after drying is only partially soluble, differing in this respect from sclerotic acid, which is soluble in all proportions before and after drying.

Sclerotic Acid is obtained in a nearly pure state by kneading the mixed sclerotates as obtained above with 80 per cent. alcohol, and afterwards dissolving them in 40 per cent. alcohol; the solution is mixed with an excess of hydrochloric acid, and after several hours precipitated with absolute alcohol, whereby the ash is reduced to about 3 per cent., and consists mainly of some silica, manganese; and phosphates of iron and potassium. The acid is not a glucoside, and yields no precipitates with the reagents for alkaloids, except with phosphomolybdic acid a yellow, and with tannin a nearly colourless one. Sclerotic acid is obtained as a yellowish brown, tasteless, and inodorous substance, which has a very slight acid reaction, and is hygroscopic without being deliquescent. It is very well adapted for subcutaneous appliances in doses of 0·03 to 0·045 gram.

Scleromucin is darker in colour, slightly hygroscopic, gummy, inodorous, and tasteless; yields 26·8 per cent. of ash, and, like sclerotic acid contains nitrogen; is not a glucoside, and is precipitated by tannin and phosphomolybdic acid.

Good ergot yields about 4 to 4½ per cent. of sclerotic acid, and about 2 to 3 per cent. of scleromucin.

In the commercial extracts the acid is found in variable quantities,

depending on the strength of alcohol used in their manufacture. Scleromucin is generally not present, except sometimes in very small quantities, as, for instance, in Bonjean's ergotin, which contains considerable sclerotic acid.

The following colouring matters have been isolated from ergot: yellow crystalline scales of *scleroxanthin*, in combination with the pale yellow needle-like crystals of its anhydride termed *sclerocrystallin;* also an amorphous mass, soluble with difficulty in ether, alcohol, and chloroform, to which the name *scleroiodin* has been given. By far the most important colouring matter, however, is *sclererythrin*, to which the characteristic reactions of ergot are due which were erroneously ascribed to a ferruginous substance supposed to be allied to the colouring principle of blood.

If ergot is exhausted by ether or alcohol, and then treated with acidulated alcohol or ether, sclererythrin will be liberated from its calcium compound, and produce a red solution. Diluted solutions of alkalies and alkaline carbonates dissolve sclererythrin, with a beautiful murexide colour. Ether agitated with this solution is not coloured, but after neutralizing with an acid a delicate and characteristic reaction occurs, by imparting a red-brown colour to the ether. Alcohol or ether will not dissolve the sclererythrin directly from ergot, unless the drug be previously acidulated.

In connection with the above investigations, Dragendorff and Podwissotzky isolated a bitter alkaloid, which they call *picrosclerotine*, and a yellow acid, which they named *fuscosclerotic acid*. They were obtained in purifying sclererythrin, by precipitating its alcoholic solution with lime water, when picrosclerotine and fuscosclerotate of calcium remained in solution; on the addition of dilute sulphuric acid and agitating with ether, this solvent took up the fuscosclerotic acid and left nearly all picrosclerotin behind, which is readily dissolved by acetic or sulphuric acid and reprecipitated by ammonia.

A solution of the amorphous alkaloid subcutaneously injected was observed to produce in frogs decreased sensibility, paralysis of the extremities, and in ten or twelve minutes death, without convulsions. Blumberg noticed that picrosclerotin is coloured violet by oil of vitriol, and that in the isolated state it rapidly loses its activity, forming a resinous mass, which is insoluble in acetic and dilute sulphuric acid, and coloured brown by oil of vitriol. It is identical with the resin obtained by Ganser (1870) from the fixed oil of ergot, from which Blumberg isolated also a crystalline alkaloid, closely allied and probably identical with picrosclerotin.

As above stated, the filtrate showing the reactions of Wenzell's

alkaloids proved to be destitute of medicinal action; Dragendorff and Podwissotsky isolated the alkaloids by Wenzell's process from this filtrate as well as directly from ergot, and found that both ergotina and ecbolina are precipitated by corrosive sublimate from their concentrated solutions, and that both contain admixtures of different salts and foreign matters. Blumberg has made the same observation, and agrees with Dragendorff in regarding the two as only one alkaloid, which is but partly precipitated by corrosive sublimate, since its compound with the latter is not insoluble in water, the solution being, however, precipitated by phosphomolybdic acid.

Blumberg has also isolated the crystalline alkaloid *ergotinine* observed by Tanret in 1875. The oil of ergot, obtained by extraction with ether, is repeatedly agitated with water acidulated with sulphuric acid, and the acid solution rendered alkaline by carbonate of sodium. The precipitate may be dissolved in ether or in absolute alcohol, which solutions on being concentrated yield crystals of ergotinina. These are coloured violet-blue by oil of vitriol, and by Froehde's reagent at first violet, then soon blue, finally blue-green, and on heating olive-green. Ergotinine soon decomposes, forming a resinous mass, and when in solution, injected subcutaneously, produces in frogs effects very similar to those observed from picrosclerotine.

Note on the Constituents of Ergot. Prof. G. Dragendorff. (*Pharmaceut. Zeitung für Russland*, 1877, No. 20.) The author announces that he has succeeded in separating one of the substances, which he formerly obtained and named sclererythrin (see *Year-Book of Pharmacy*, 1876, 247), into three bodies, one being sclererythrin proper, another being a very bitter alkaloid picrosclerotine, and a yellowish brown acid, fuscosclerotic acid.

The Constituents of Ergot. Prof. G. Dragendorff. (*Chem. Centralbl.*, 1878, 125–127 and 141, 142.) Ergot contains cellulose, mycose, mannite, oil, cholesterin, ecboline, ergotine, ergotinine, picrosclerotine, methyl and trimethylamine, leucine, lactic, phosphoric, sclerotic, fuscosclerotic, and scleromucic acids, scleroiodin, scleroxanthin, sclererythrin, and sclerocrystallin. Fresh ergot contains about 30 per cent. of fat, and from 0·64 to 0·79 per cent. of scleromucin and 5·89 to 6·56 per cent. of sclerotic acid; but after it has been kept for some months, the ergot contains only 20 per cent. of fat and 3 per cent. sclerotic acid, the amount of scleromucin increasing to 3 per cent.

Fuscosclerotic Acid, $C_{14}H_{21}O_7$.—Fuscosclerotic acid and sclererythrin are extracted by ether from ergot which has been previously treated

with tartaric acid. The two substances are separated by means of the insolubility of the calcium compound of sclererythrin in ether. When the yellow ethereal solution of fuscosclerotic acid is shaken up with ammonia, the acid passes into the ammoniacal solution, and leaves the ether colourless. Potassium, sodium, and ammonium fuscosclerotates are soluble in water.

Picrosclerotin is less soluble in ether than fuscosclerotic acid. It is difficultly soluble in pure water, but dissolves easily in very dilute acids, and is reprecipitated by ammonia. Picrosclerotin contains nitrogen, has a bitter taste, and is a very active poison.

Œnothera Biennis. (*Chemist and Druggist*, March, 1878, 109.) This plant, well known as the evening primrose, tree primrose, and night primrose, in cottage gardens in England, seems to be a native of North America. It is found there growing in hedgerows from Canada to Carolina. Some botanists consider it to be naturalized as a British wild plant, but Loudon says that it was introduced from North America in 1629. The name is derived, according to Loudon, from the Greek *oinos*, wine, and *theră*, to hunt, for the reason that the roots of this plant, eaten after meals, are, like olives, incentives to wine drinking. Others derive it from the supposed vinous smell of the root. The plant is said by De Candolle to be cultivated for the sake of its roots, which are sweet, and are eaten in some countries as a spring salad. Schoepf states that it is esteemed as a vulnerary. Its medicinal properties seem to be attracting considerable attention among American practitioners. Dr. G. B. Wood states in the *United States Dispensatory* that the late Dr. R. E. Griffiths found it valuable in many diseases which show themselves by eruption. He used a decoction of the small branches, leaves, and the bark of the stem and larger branches, and applied this as a lotion to the affected part several times a day. He found it more useful in tetter than in any other disease. He considered its virtues to reside in the mucilage of the cortical layers, which leaves a slight sensation of acrimony on the fauces.

Early in 1877 Dr. R. N. S. Davis wrote to the *American Practitioner*, stating that he had found it a mild but efficient sedative to nervous sensibility, acting more especially on the pneumogastric nerve. He recommended it for further trial in whooping cough, spasmodic asthma, and certain sensitive conditions of the stomach interfering with healthy digestion. More lately Dr. J. F. Sullivan, of Western America, states that eight years' experience has taught him also to regard it as a mild sedative, with the additional property of being an alterative in many diseased conditions of the mucous

surfaces. He has found it useful in many cases of dyspepsia, accompanied by an irritable state of the stomach and bladder, but believes "its chief value will be found in typhoid fever, to the treatment of which it is peculiarly adapted by its soothing action upon the intestinal mucous surface." Both the authorities above mentioned give directions as to the dose of the infusion, extract, or fluid extract, but with equal unanimity they neglect to state the strength of the preparations they used. Their directions are, therefore, obviously useless.

Sophora Speciosa, Benth. Prof. H. C. Wood. (*New Remedies*, from *Medical Times*.) This newly-described medicinal substance is a small red bean, irregularly oval or roundish, about one-third of an inch in length, and having a slightly bitter taste, with an after feeling of numbness when chewed. Some of these beans have been sent to the Smithsonian Institute, at Washington, by Mr. Edmund Billinger, senior, of Texas, who stated that they were occasionally used by Indians in the neighbourhood of San Antonio, south-western Texas, as an intoxicant; that a half bean would produce delirious exhilaration, followed by sleep, lasting two or three days; and that it was asserted that a whole bean would kill a man.

Some of these beans having been sent to the author, he obtained other samples from Mr. Billinger, and, together with the latter some of the flowers of the plant. Dr. Rothrock, Professor of Botany in the University of Pennsylvania, after an examination of the latter, pronounced the source to be the *Sophora speciosa* of Bentham.

The author obtained a small amount of organic principle from the beans, which is extremely active as a poison, the minutest speck producing, in two minutes, almost entire paralysis in the frog. One-twentieth of a grain of a very impure specimen produced in a half-grown cat deep sleep lasting many hours. As the substance is not soluble in water, but is soluble in acidulated water, and is precipitated by alkalies, and as it dissolves freely in ether, imparting to it a decidedly alkaline reaction, he looks upon it as an alkaloid, and gives it the name of *sophoria*. The sample obtained was of a greyish white colour, but he did not succeed in crystallizing either it or its acetate. Its reactions, so far as he had examined them, were as follows (the tests being made by placing a speck of the alkaloid upon a porcelain plate and applying the reagent):—

With concentrated sulphuric acid, no colour.

With chromic acid and concentrated sulphuric acid, a dirty deep purple, passing rapidly into bright green, then into bluish, and finally into yellowish brown.

With tincture of chloride of iron, a deep, almost blood red, after a time acquiring an orange tint.

With nitric acid, no colour.

With chromic and nitric acids, a very faint evanescent, reddish colour.

With nitro-muriatic acid, a dirty reddish brown.

From the solution of its acetate, compound tincture of iodine throws down a yellowish precipitate.

The experiments made upon the lower animals, with a view to determining the effects of the remedy upon them, show that frogs rapidly lose reflex activity and power of voluntary movements. Further experiments demonstrated that this effect was due to the action of the drug as a spinal sedative, and that it had little or no effect upon either motor or sensory nerves. Upon *mammals* the effect varies somewhat, according to the dose. An amount of the extract estimated at two grains produced in a full grown cat, in one minute, marked weakness in the hind legs; in two minutes, inability to stand, with evident effect upon the respiration; in three minutes convulsive movements, with loss of consciousness, continuing with increasing embarrassment of breathing for three minutes, when all attempts at respiration ceased. The heart kept on beating for one and a half minute longer. The pupils were unaffected at first, afterwards dilated. In small quantity the extract produces, in the cat, vomiting, great muscular weakness, profound quietude, and deep sleep lasting some hours and ending in recovery.

Similar symptoms occurred in dogs.

Death always took place through stoppage of respiration. In a single cardiac experiment, the drug had no decided effect upon the blood-pressure, until towards death, but appeared to accelerate the heart-beat.

Contributions to the Chemical Knowledge of Cacao. P. Troganowsky. (*Archiv für Pharm.* [3], x., 32–37; *Journ. Chem. Soc.*, 1877, 363.)

1. *Preparation of Theobromine.*—A weighed quantity of powdered cacao is treated with petroleum ether to remove fat; the residue is mixed with an equal weight of the original cacao powder; magnesia and water are added, and the mixture dried at 60°–70°. The dried mass is powdered very finely and boiled in a flask with 80 per cent. alcohol, repeating the boiling a second time; the mixture filtered whilst hot; the filtrate evaporated on a water bath; and the residue treated with petroleum ether and washed on a filter with alcohol, until the theobromine loses its brownish colour and becomes colourless. The quantity of alcohol used for washing is measured, and from this the quantity of theobromine dissolved is calculated and added to that left on the filter. The author undertook a large

number of analyses by this method, the results of which seem to show that the amounts of theobromine do not always correspond with the quality and value of the samples of cacao.

2. *Cacao Fat.*—A weighed quantity of cacao is extracted with petroleum ether, and the residue left on evaporation is weighed. It is shown that the fatty matter is fairly the same with all kinds of cacao, so that it cannot be used for distinguishing various qualities The author condemns Bjorklund's method of treating cacao with ether in order to ascertain whether the fatty constituents in cacao consist of cacao fat or of animal fat.

3. *Starch.*—The cacao, after exhaustion with petroleum ether and 80 per cent. alcohol, is treated with 6 per cent. alcoholic potash-ley, and digested for twenty-four hours. After this it is first washed with alcohol, then with distilled water, until the washings are colourless; and the residue is boiled with sulphuric acid until all the starch has disappeared. The sugar produced is then estimated and from the latter the quantity of starch calculated. The amount of starch in cacao does not vary sufficiently to be used as a means of distinguishing between various qualities. In chocolate, however, the quantity of starch should not exceed 7 per cent. (after deducting the amount of sugar).

By treating cacao, exhausted with petroleum ether with alcohol, the author obtains various coloured tinctures whose behaviour to reagents he uses for distinguishing various substances contained therein. Since the presence of alcohol very often hinders the reactions, aqueous extracts were prepared. The following results were obtained:—

The first few drops of sulphuric acid produce a change of colour in the liquid (see II.).

I. The first drops of acid produce no change: Caracas, Puerto Cabello, Surinam.

1. To another portion of the solution add cupric sulphate:

a. The liquid assumes a bluer colour, with turbidity, and turns green when boiled, depositing blue flakes: Caracas.

b. The liquid assumes a green colour, and yields a blue precipitate, turning brown on boiling: Puerto Cabello, Surinam.

2. Another portion is treated with nitric acid:

a. No reaction: Surinam.

b. Violent reaction, assuming yellow colour: Puerto Cabello.

II. The liquid assumes a raspberry-red colour after the addition of the first drops of acid; but turns brown, and lastly black, when the whole of the acid is added.

1. Nitrate of silver is added:

a. White precipitation: Para, Guayaquil, Trinidad.

b. Greyish white precipitate: the liquid in which the precipitate is suspended is:—

a. Colourless: Domingo.

β. Reddish: Bahia.

c. Blue violet flakes in pink solution: Martinique.

2. Another portion of the solution is treated with neutral acetate of lead:

a. Light brown flakes, reddish liquid: Para.

b. White flakes, liquid colourless: Guayaquil, Trinidad.

3. Treated with stannous chloride: pink precipitate, pink liquid:

a. Turning lighter when boiled: Guayaquil.

b. Turning violet when boiled: Trinidad.

4. *Albuminates.*—Several analyses proved that the amounts of albuminate are of but little importance in estimating cacao.

5. *Ash.*—The percentages of ash are nearly the same in all kinds; but the husks are richer in ashes than the cotyledons. In chocolate the quantity of ash should not be higher than 4 per cent., otherwise an adulteration with cacao husks may have taken place.

Cocoa. C. Heisch. (From *The Analyst.*) The results of the author's analysis are embodied in the following table:—

Examination of Roasted Bean after removal of Husk.

	Husk.	Fat.	Nitrogen.	Albuminoid Substances.	Ash.
Caracas . . .	13·8	48·4	1·76	11·14	3·95
Trinidad . . .	15·5	49·4	1·76	11·14	2·80
Surinam . . .	15·5	54·4	1·76	11·14	2·35
Guayaquil . .	11·5	49·8	2·06	13·03	2·50
Grenada . . .	14·6	45·6	1·96	12·40	2·40
Bahia	9·6	50·3	1·17	7·40	2·60
Cuba	12·0	45·3	1·37	8·67	2·90
Para	8·5	54·0	2·00	12·66	3·05

	Ash soluble in Water.	Ash soluble in H Cl.	H_3PO_4 in Ash.	Moisture.	Starch, Gum, Cellulose, etc.
Caracas . . .	2·15	1·80	1·54	4·32	32·19
Trinidad . . .	0·90	1·90	0·93	3·84	32·82
Surinam . . .	0·80	1·85	1·23	3·76	28·35
Guayaquil . .	1·75	1·75	1·87	4·14	30·47
Grenada . . .	0·60	1·80	1·35	3·90	35·70
Bahia	0·90	1·70	1·26	4·10	35·30
Cuba	0·95	1·95	1·13	3·72	39·41
Para	1·10	1·65	1·00	3·96	26·33

Some Constituents of Hops. E. J. Russell. (*Amer. Journ. Pharm.*, Dec., 1877.) It is pretty generally supposed that lupulin contains all the active principles of the hop. Some doubt in regard to this having been recently expressed, the writer has endeavoured to settle the question; with what success may be judged from the following experiments. The best of hops were selected, those as nearly ripe as could be found during picking; from these the bracts were carefully removed; the ends next to the achenes, to which parts of the bracts most of the lupulin adheres, were trimmed off with scissors; the remainder of each bract was then passed between the thumb and finger to remove the remaining particles of lupulin, a magnifying glass being used from time to time to see that the work was thoroughly accomplished. This process is a difficult and tedious one, the lupulin adhering to the bracts with considerable tenacity. The bracts were then allowed to dry, without the aid of artificial heat, and were found to shrink about three-fourths in weight; after much perseverance, one troy ounce of the dried bracts was obtained. Some difficulty was next experienced in powdering them; rubbing them with sand in a mortar was first tried, and found to be exceedingly slow work; grinding in a drug mill was next attempted, but found to be simply impossible; the method finally resorted to, and found to work nicely, was to cut the bracts in pieces with shears. This may readily be done by grasping the hand full of them, and passing the shears repeatedly through many of them at once, sifting out the fine particles from time to time. The powder thus obtained was exhausted with stronger alcohol, and a tincture obtained possessing a bitter taste and some odour, neither of which would, however, hardly remind one of the hops. The alcohol was distilled off from the tincture, and an extract obtained weighing seventy grains. To the distillate was added some water, the alcohol distilled off at a gentle heat, and the heat then raised. The distilled water was observed to have a slight foreign odour, but could not be recognised as the odour of hops. It had no effect on litmus paper, and produced no change in colour with a solution of permanganate of potassa, evidently containing not more than the merest trace of volatile organic matter.

Of the extract obtained, 20 grains was reserved for further experiment, the remaining fifty grains being tried in the following manner:—One half of it was given to a healthy person; no effect being experienced: in one hour the remainder was given; no effect whatever was noticed upon either pulse, temperature or respiration. The portion reserved was dried by means of the water bath until it

ceased to lose weight, after which the weight was found to be 1·013 gram; of this, ·225 gram, or about 22 per cent., was insoluble in water; the portion soluble in water was found to give the reactions characteristic of tannin, and also to contain a small amount of bitter extractive. The amount of the extract reserved was, however, too small to admit of many experiments.

The author then endeavoured to determine the nature of the tannin contained in hops, 700 grains of which were exhausted with boiling water, the decoction evaporated nearly to extractive consistence, and treated with alcohol to remove the gummy matter. The alcohol was evaporated and the residue dissolved in water; the percentage of tannin was then estimated by means of a standardized solution of gelatin containing alum; only about 6 per cent. of tannin could be found. The remainder of the solution was then precipitated with neutral acetate and with subacetate of lead; the two precipitates had much the same appearance, and both were soluble in acetic acid. They were each thoroughly washed, then suspended in water, and decomposed with sulphuretted hydrogen. The filtrate from each was found to contain the tannin, which gave a blackish green colour with ferric chloride, and precipitated a solution of gelatin containing alum. The two solutions were mixed and the tannin precipitated with an excess of common salt, from which an unsuccessful attempt was made to entirely free it.

For the final experiment, six ounces of hops were taken and exhausted with boiling water; the decoction was concentrated, treated with alcohol, filtered, the alcohol evaporated off, the residue dissolved in water, and the percentage of tannin estimated as before; only a little more than five-tenths per cent. being found. The solution, being acid to test paper, was carefully neutralized with ammonia and precipitated with neutral acetate of lead, a bright yellow precipitate being obtained; the filtrate gave no reaction with subacetate of lead, and contained no tannin. The precipitate was thoroughly washed, suspended in water, decomposed with sulphuretted hydrogen, the precipitate washed until the washings gave no colour with ferric chloride, and the filtrate evaporated to a small bulk, and shaken with ether in hopes that the tannin might be dissolved; the ether, however, failed to take up any of the tannin, and portions of the solution were therefore treated with the following reagents:—tartar emetic, which produced a nearly white precipitate on standing; ferrous sulphate had no effect; sulphuric and hydrochloric acid at once produced precipitates; protochloride of tin had no effect; sulphate of copper, no effect; solution of potash gave a dark reddish brown

colour but no precipitate; gelatin gave a precipitate on standing. The green-black precipitate with ferric chloride certainly indicates that this is not gallotonic acid, which in other respects it resembles; and the reaction with the mineral acids would seem to show with equal certainty that the tannin is not moritannic acid, which it is stated by Wagner to resemble.

Thuja Occidentalis. J. R. Leaming. The following memoranda relative to the use of preparation of *Thuja occidentalis*, which appears just now to be attracting some interest in New York, have been contributed by the author to *New Remedies*.

The fluid extract or saturated tincture may be given in dram doses, from three to six times daily. It may be given for malignant disease or for pulmonary hemorrhage in a glass of milk or in cod liver oil. It may also be applied to cancerous ulcerations or tumours. It may be applied in the cavity—in the os—or to the cervix of the uterus in malignant disease, or in non-malignant, when there is a flabby condition of the parts with a tendency to bleed; and also, under the same conditions, to the throat. It may be applied to warts, and especially to venereal warts.

It may be given in amenorrhœa from simple causes, but does not affect a healthy gravid uterus.

The elixir of thuja and glycerin is a more elegant mode of administering the medicine, and is a valuable substitute for cod-liver oil.

The glycerole may be made into suppositories, or it may be mixed with the fluid extract, for application to the os uteri upon a pessary of cotton.

This medicine may become useful to the practitioner in the treatment of malignant disease, especially in diminishing tendencies to bleeding and rapid progress of the local disease. It also relieves the violence of pain. In some cases the disease has disappeared under its use—not always.

The literature referring to this drug is quite limited. A. Kawalier, of Vienna, discovered a bitter principle, which he called *pinipicrin* (found also in *Pinus sylvestris*), a volatile oil, sugar, gelatinous matter, a variety of wax, resin, and tannic acid (*Chem. Gaz.*, Feb. 1, 1855, 45); and more recently a peculiar crystallizable colouring principle, which he called *thujin*, another yellow substance which he called *thujetin*, and still a third *thujigenin*; also a variety of acid, which he named *pinitannic*. Kawalier's second paper in the *Chem. Gaz.*, Nos. 392, 393, pp. 61, 68, 1859, is said to contain a full description of the processes he employed.

Regarding the properties of thuja, the wood when burnt gives off an agreeable smell, which led to its former use for sacrificial purposes. A salve made of the leaves used to be a remedy employed by the Indians for the relief of rheumatism, and a poultice of the leaves made with milk has been highly spoken of for the same purpose. By distillation the leaves yield a yellowish green volatile oil, which has been used as a vermicide. Boerhaave praised the action of the distilled water as a remedy for dropsy.

Some years ago the author contributed a paper to the *New York Journal of Medicine* (N. S., xiv., 406), on the use of thuja in affections believed to be cancerous, and in venereal excrescences; and in 1856, in the same journal, Dr. Benedict recommended the strong tincture as an emmenagogue.

Thus far thuja appears to have been employed empirically only, but it would seem, on reviewing the affections in which it had been of service, that its action may be explained by a property somewhat similiar to that possessed by ergot, namely, of causing contraction of unstriped muscular fibres. This would explain, in some degree, its alleged power of controlling capillary hemorrhage, and the growth of vascular tissues like cancer and condylomata.

The Poisonous Principle of Urechites Suberecta. J. J. Bowrey. (*Chemist and Druggist*, from a paper read before the Chemical Society, April 18, 1878.) This plant grows wild in Jamaica. It has dark green leaves, and large, bright yellow flowers; it is locally called "nightshade." It is known to be very poisonous. The author has extracted from the fresh leaves of the plant, by the use of alcohol and water, and a temperature not exceeding 38° C. a white crystalline body, urechitin, $C_{28}H_{32}O_8$, to the presence of which the plant owes its poisonous properties. It is very soluble in hot alcohol, chloroform, and glacial acetic acid; almost insoluble in water and dilute spirit. It is intensely bitter and very poisonous. It gives with strong sulphuric acid a characteristic colour reaction, the liquid passing from yellow through red to purple; a trace of nitric acid increases the rapidity of the colour changes. If the leaves are dried at 100°, urechitoxin is obtained, either crystalline or amorphous. This substance resembles urechitin in its chemical and toxical properties. Both substances are glucosides.

Kariska. S. Martin. (*Pharmaceut. Zeitung*, 1878, 210.) The author recently called the attention of the Société de Pharmacie de Paris to some seeds belonging to the family *Zingiberaceæ*, as known to the Abyssinians as *kariska*. The drug is very rich in fixed and volatile oil, and possesses a warm, aromatic, and slightly sweet taste.

It is valued by the natives probably on account of its tonic properties.

Notes on Medicinal Plants of Liberia. E. M. Holmes. (*Pharm. Journ.*, 3rd series, viii., 563.) The plants here noticed were sent by the nephew of the late President of Liberia, Dr. Roberts, who also intends to forward others.

Fever Plant (*Ocymum viride*, Willd.).—This is an erect, somewhat shrubby plant, about three feet high, with ovate lanceolate acuminate leaves from one to two inches long, the leaves being crenate at the margin, and abundantly dotted underneath with oil glands. From *O. gratissimum*, L., a closely allied species, it differs chiefly in its lesser size and in the teeth of the calyx being less united. The plant when rubbed or chewed gives off a strong odour like that of lemon thyme (*Thymus citriodorus*, Schreb).

Lindley states that *Ocymum viride* is used in Sierra Leone as a remedy for the fevers prevalent in that country.

Dr. Roberts affirms that in Liberia it is the common remedy for fever of any kind, and that he has entirely substituted it for quinine in his practice, since he finds it much cheaper and equally effectual. It is given in the form of an infusion, a wineglassful being administered at intervals until perspiration is freely induced, the patient being kept warm in bed.

The thyme-like odour of the plant suggests that its properties may possibly be due to the presence of thymol, a substance which has recently attracted some attention, and deservedly so, since it belongs to the highly antiseptic group of phenols, and can be taken internally with much less danger than carbolic acid. What is known of the properties of *O. viride*, and a few other species nearly allied to it, still further strengthens this supposition. *O. canum*, Sims, *O. gratissimum*, L., in India, and *O. crispum*, Thumb, in Japan, are used to restrain mucous discharge in catarrh; *O. sanctum*, L., is used in India, according to Ainslie, as a febrifuge, and a decoction of the seeds of *O. gratissimum* is used in Brazil for gonorrhœa. Dr. Waitz found the same plant cure aphthæ in children when ordinary European remedies failed. *O. temuflorum*, L., is used as an aromatic stimulant in Java.

Dr. Lewin, in Virchow's "Archives," has lately pointed out that thymol, in the proportion of 1 part to 1000 is capable of arresting various processes of fermentation, and recommends it as a remedy for stomachic fermentation and dilatation, and in diseases depending upon the action of living organic germs, such as diphtheria. He states also that it arrests excessive secretion from mucous membranes.

From the above remarks it will be seen that the properties of the fever plant very closely resemble those of thymol. It remains to be determined, however, whether its efficacy is due to thymol alone or to some other constituent as well.

Hemorrhage Plant (*Aspilia latifolia*, *O. and H.*).—This is a herbaceous plant belonging to the natural order *Compositæ*, from one and a half to four feet high, with speading branches and opposite very rough foliage. The leaves are ovate, acuminate, minutely serrate, and very hard to the touch owing to the leaf being covered with very short rigid hairs. The flowers are yellow and about the size of the fleabane (*Pulicaria dysenterica*, Gaertn.). The florets of the ray are neuter, a feature which readily distinguishes this genus from those African genera to which it is most nearly allied. From the other African species of the same genus it is known by the pappus being almost obsolete, by the shape of the leaves, and by the scales of the involucre being equal in height to the florets of the disc. The account given by Dr. Roberts of the hæmostatic properties of this plant partake of the marvellous. He states (*in litt.*) that the natives always prefer to use it to any treatment adopted by the Europeans. He further says that he has witnessed its use in several cuts where arteries had been severed, the leaves and flowers being pounded together and applied to the wound, the hemorrhage stopping in a few minutes, and the wound healing rapidly without any other application. The decoction in doses of ʒss. three times a day, is used in hemorrhage from the lungs. Dr. Roberts is not sure whether the dried plant would answer as well, as he had only seen the fresh plant used. The properties of this plant certainly are worth investigation, so that it may be determined whether its action is merely mechanical, like that of matico, or whether its juice, like that of *Jatropha Curcas*, L., possesses an inherent property of coagulating the fibrine of the blood.

Small Senna (*Cassia occidentalis*, L.).—The leaves of this plant are used in Liberia as a purgative, and are known under the above name; while those of a plant with larger leaves, apparently a *croton*, are known as "large senna." The materials as yet received are not sufficient to identify the latter plant. According to the "Plants Médicinales de Maurice," Dr. Livingstone brought to the Botanical Gardens at the Mauritius the seeds of this plant, of which he stated that the natives in the interior of Africa roasted and used them like coffee. It is now naturalized in the Mauritius, and is said to be used occasionally with good effect in certain cases of asthma, and also as a fomentation in some diseases of the skin. According to

Macfayden, a decoction of the root possesses diuretic properties, and the leaves are used by the negroes, when smeared with a little candle grease, as a substitute for adhesive plaister. Martius states that in Brazil, where the plant is called *gaju marioba*, the root is used in incipient dropsy and in obstructions and weakness of the stomach, it being considered a powerful stimulant to the lymphatic system. It does not appear that the seeds, leaves, or roots, are so used in Liberia. *C. occidentalis* is also common in both the East and West Indies. Pipybras (*Scoparia dulcis*, L.). This scrophulariaceous plant, which is common in tropical countries in all parts of the world, is used in Liberia for gravel and kidney complaints. A wine-glassful of the decoction is taken when cold, three times a-day, tea and coffee being forbidden during its use. The leaves are broadly lanceolate, serrate, thin, and smooth. The two-valved fruit when mature dehisces septicidally, showing the placenta and seeds free in the centre. The plant is herbaceous, one to three feet high and much branched, the leaves and branches being usually in whorls of three. The small white flowers have remarkably slender short pedicils and are arranged in a racemose manner.

Sassy Bark (*Erythrophlœum Guineense*, Don.). This tree, which is abundant in Liberia, is only used as a poison. Its medicinal properties have only recently been investigated by Dr. T. Lauder Brunton (*Lancet*, March 17, 1877, 377.) The plant has already been reported upon in the *Year-Book of Pharmacy*, 1876, 246, and 1877, 170.

The Constituents of Podophyllum Peltatum. W. C. A. Busch. (Abstract from an Inaugural Essay. *Amer. Journ. Pharm.*, Nov., 1877, 548.) The resin was prepared by mixing the concentrated tincture,—

1. *With Water.*—A turbid liquid was obtained, which after a time produced a light grey precipitate, completely soluble in ether and alkalies. On being again set aside, the turbid liquid settled very slowly; but on the addition of a little muriatic acid it became clear, and the dark grey precipitate was found to be nearly insoluble in ether, but readily soluble in alkalies.

2. *With Acidulated Water.*—A greyish precipitate was readily obtained, which retained its colour if dried at the ordinary temperature; a higher temperature deepened the colour very perceptibly, and caused the resin to fuse to a blackish brown mass, which on being dissolved in alcohol and precipitated by cold acidulated water was again obtained as a greyish powder. It was completely soluble in alcohol and alkalies, and partly in ether. On incineration a

little ash was left. With hot water a solution was obtained which precipitated on cooling; cold water dissolved a little of the resin, the yellowish colour of the solution being discharged by an acid, and reproduced with a darker shade by alkalies.

3. *With Alum Solution.*—A bright yellow pulverulent precipitate was obtained, which darkened somewhat by hot water, but did not fuse to a brown mass. On incineration an ash was left, consisting mainly of alumina; boiling with dilute hydrochloric acid removed most of it from the resin, which afterwards left but very little ash.

Resin Soluble in Ether.—The officinal resin, obtained by precipitation with water acidulated with muriatic acid, yielded to ether sixty per cent. of its weight. This portion dissolved in alcohol with a light brown colour; the solution had a bitterish taste, and was precipitated light greyish by water, bright yellow by alum solution, and orange-yellow by alcoholic solution of lead acetate. All the precipitates dissolve to some extent in hot water, most of the dissolved portion being reprecipitated on cooling. The alum precipitate left 1·25 per cent. of ash, consisting of alumina; the resin obtained by evaporating the ether left no fixed residue.

Resin Insoluble in Ether.—It was found to have a bitter taste and to be soluble in alcohol and alkalies, and slightly so in water. The alcoholic solution became turbid on the addition of water, and very gradually yielded a greyish precipitate; acidulated water produced a similar precipitate, solutions of alum and of acetate of lead somewhat darker, but not yellow precipitates. The bright yellow colour of the resin prepared with alum solution is therefore due only to the resin soluble in ether.

The aqueous solutions of both resins gave no reaction with Mayer's solution, except in one instance; their alkaline solutions were of a yellowish brown colour, when sufficiently diluted with water were not precipitated by acids, and after having been boiled with dilute hydrochloric acid gave no indication of sugar with Trommer's test.

Principles Soluble in Water.—The tincture precipitated with acidulated water yielded a reddish filtrate, of a very bitter taste, and containing sugar, as indicated by Trommer's test. On concentrating the solution, an amorphous bitter mass separated, which dissolved in alcohol, but could not be obtained in a crystalline state.

The filtrate obtained by precipitating with alum solution was likewise bitter, and on being concentrated changed to ruby-red and separated crystals of alum; a blackish, semi-fluid, bitter substance

was likewise separated, which was insoluble in ether, carbon bisulphide, and petroleum benzin, but dissolved in alcohol and warm water. It was not obtained in a crystalline state. On mixing the tincture of the rhizome of podophyllum with ether a dark coloured mass separated, which had a very bitter taste, but contained sugar, as indicated by Trommer's test.

Resina Podophylli. G. H. C. Klie. (*Amer. Journ. Pharm.*, 1877, 578.) From the author's experiments it appears that weak spirit of wine is preferable to rectified in the preparation of this resin. In all operations percolation was carried on until $1\frac{1}{2}$ pint of tincture had been obtained. The tincture remaining in the mass was displaced with water; this generally increased the percolate to 2 pints. This was invariably concentrated to 8 fluid ounces, regaining the alcohol by distillation. When dilute alcohol had been used for exhaustion, in the subsequent process of concentration the resin would separate and settle on the bottom of the still. It had to be redissolved in alcohol for precipitation. The following results were obtained :—

16 troy ounces of Podophyllum root exhausted with Alcohol.	Precipitated in	Weight of Product.	Colour of Product.
Sp. Gr.		Grams.	
·825	6 drams Muriatic Acid to 4 pints Water	236	Like licorice root powder.
·825	½ oz. Alum to 4 pints Water .	223½	Greenish yellow.
·825	120 minims Muriatic Acid to 4 pints Water	222	A trifle lighter than powdered ipecac. root.
·825	4 pints Water	223	Like powdered ipecac. root.
·930	½ oz. Alum to 4 pints Water.	557	Greenish yellow.
·938	6 drams Muriatic Acid to 4 pints Water	340	Like powdered licorice root.
·938	120 minims Muriatic Acid to 4 pints Water.	352¾	Brownish yellow, with a tinge of green.
·938	4 pints Water	352	Somewhat darker than powdered scammony.
·945	½ oz. Alum to 4 pints Water .	243½	Like powdered extract of licorice.
·945	80 minims Muriatic Acid to 4 pints Water	244	A trifle lighter than common emery flour.
·945	4 pints Water	246	Same as foregoing.

This table shows such a large yield for the alcohol of ·930 sp. gr. that it was concluded, making proper allowance for difference in

the root and thoroughness of exhaustion, that by using it for the preparation of the resin the most satisfactory results would be obtained.

The Colour of Podophyllum Resin. Dr. A. Senier and A. J. G. Lowe. (*Pharm. Journ.*, 3rd series, viii., 443.) It is well known that trade specimens of this resin vary considerably in colour. The authors show that these variations of tint do not in any way affect the activity of the resin. The sizes of the resin particles, and the consequent variation in density of the powder, is, in their opinion, the probable cause of the difference in shade. They do not attribute the yellow colour of some specimens to berberine, but rather to the acid colouring matter of the rhizome. The use of alum water and of certain other solutions in the place of acidulated water results in the production of a bright yellow resin. Alum thus applied would, of course, materially increase the percentage of ash left on incineration of the resin. The bright yellow resin obtained by the use of alum solution was tried physiologically, and found to be as active as the officinal preparation. The authors therefore think there would be no disadvantage to the patient if these various coloured commercial resins were substituted for the particular coloured resin ordered by the Pharmacopœia, provided, of course, that they answered in other respects the official requirements.

Tayuya as a Remedy for Syphilis. (*Wien. Med. Zeitung*, No. 3, 1878.) Tayuya has been highly recommended during the past few years as a remedy for syphilis and scrofula. It has been used chiefly by the Italian surgeons. All parts of the plant are used, but the most efficacious in syphilis is the root, either as a watery infusion or a tincture made by adding 1000 grams of 80 per cent. alcohol to 339 grams of the powdered root. The strong tincture thus obtained is to be diluted by the addition to it of 1000 grams of rectified spirit. Of this 14 drops is the maximum dose for an adult.

Ambrosolio, who has used it freely in the Maggiore and Sifilocomio hospitals of Milan, reports favourably on its use in syphilis, and states that skin affections, ulcerations, and swellings of the glands are promptly relieved by it. Veladini reports "brilliant results," as do also Magri, Strambio, Bazzoni, and others. Gamba, however, in the syphilitic hospital for women in Turin, has not had such satisfactory results. Ziessl, of Vienna, states that he has seen no injurious results from tayuya, and, after giving it a fair trial, he greatly prefers it to mercury in the early stages of syphilis. He is not yet prepared to express a positive opinion as to its value in the later stages of the disease.

Maté, or Paraguay Tea. Dr. H. Byasson. (*Répert. de Pharm. et Journ. de Chim. Med.*, i., 11. From *Pharm. Journ.*, 3rd series, viii., 605.) The author having been requested by Professor Gubler to examine a specimen of "maté," or "paraguay tea," has recently presented to the Paris Academy of Medicine a note containing a *résumé* of the principal facts previously known respecting this product, together with some observations as to its chemical composition. The following is an abstract of this note.

Maté constitutes, throughout a great part of South America, the favourite drink of the inhabitants, who attribute to it innumerable virtues. The word "maté" originally designated the vessel in which the infusion was prepared; the maté tree is known as the *arvore do congonha*. The tea itself is sold under three different names, each indicating a commercial variety,—

1. *Caa-Cuyo* ("*caa*" signifies a leaf): consisting of buds scarcely expanded. It is consumed in the locality where gathered.

2. *Caa-Miri:* prepared by the Jesuits from the dried leaves carefully cleansed and powdered.

3. *Caa-Gazu:* prepared by the natives from the leaves roasted and coarsely powdered. This was the variety examined; it contained also fragments of petioles and young shoots. The powder was greenish yellow, and had a slightly aromatic odour, which was developed by contact with water.

The tree which yields the maté is the *Ilex Paraguayensis*, or *Ilex Maté*. It was first described by A. Saint-Hilliare, who found the "*arvore do congonha*," or "*arvore do maté*," growing abundantly in woods near Carabita, in Brazil. During his second voyage he established the identity of this Brazilian plant with the Paraguayan plant, he having met with the "*arvore do congonha*" in the quincunces of trees planted by the Jesuits in their ancient mission stations in Paraguay. Under the name *congonha*, however, have been also designated very different plants, belonging to the genera *Luxemburgia*, *Vochysia*, and *Trimeria*. The *Ilex Paraguayensis* grows in the wild state in the woods bordering the rivers and watercourses running into the Uruguay and Paraguay rivers. It there occurs as large as an apple tree, which it somewhat resembles in figure; but when cultivated, and the leaves are regularly collected, the plant remains as a shrub. The trunk of the tree is as thick as a man's leg, the bark is whitish and shining, and the branches and all other parts of the plant have a velvety appearance. The leaves, which have a very short petiole, are simple, cuneiform, obovate or oblong-lanceolate, dentate, shining, coriaceous, and about 1 to $1\frac{1}{2}$

inch long. The flowers are white, as large as those of the common holly, grouped in a dichotomous and trichotomous axillary inflorescence. Each flower has a calyx with four suborbicular concave sepals, a corolla with four petals, and four stamens with very short filaments; the ovary is surmounted by a four-lobed stigma. The fruit is a red drupe, the size of a peppercorn, containing four striated seeds.

The leaves are collected every two or three years, that interval being required for them to attain their full growth; the branches are cut off with their leaves, and they are dried altogether over a large fire. The leaves are then detached, sorted, and placed in large baskets where their drying is finished. After about a month the leaves are powdered, and are then ready for the market.

An infusion of the tea is prepared in a kind of cup (maté) made frequently in a calabash mounted with silver. Some persons add to the beverage a little burnt sugar or a few drops of lemon juice. The liquid is sucked up through a tube, called a "bombilla," at the lower part of which are several small holes which do not allow the passage of the fragments of leaf. The leaves can be used three times, but the infusion alters rapidly.

After some qualitative experiments, the author proceeded with the analysis as follows: 100 grams of maté were intimately mixed into a paste with 25 grams of slaked lime, and the mixture was dried slowly in a stove at 75° C. It was then exhausted successively with (1) 600 c.c. of chloroform; (2) 600 c.c. of 95° alcohol; and (3) sufficient distilled water to remove the alcohol as much as possible. The chloroform solution, of a green colour, was distilled; the dried residue, which was brown and contained crystalline needles visible to the naked eye, was treated several times with distilled water, upon slow evaporation of which a yellowish white substance was obtained that, re-dissolved in alcohol, gave after evaporation and cooling a nearly white crystalline mass. Previous experiments had indicated that this was caffeine, and the product was sublimed to obtain a better crystallization. The caffeine obtained from the 100 grams of maté weighed, after crystallization from alcohol, 1·850 gram; after sublimation, 1·734 gram, a small quantity being destroyed by sublimation.

The residue from which the caffeine had been extracted was dried over sulphuric acid. It formed a greenish brown substance, resembling in consistence the bird-lime extracted from the common holly, but less elastic and darker in colour. This glutinous substance dissolves in all proportions in ether; it becomes nearly liquid at 80°,

and it burns with a white fuliginous flame. Strong solution of potash attacks it with difficulty. Attempts to purify it and determine its chemical character were not successful on account of the small quantity operated upon, and especially the difficulty in removing the green colouring matter with which it is impregnated. The following experiment indicates that it must be considered to be a fatty body or compound ether, the alcohol of which would be near to cholesterine. Two grams were submitted to the prolonged action of a hot alcoholic solution of potash, care being taken to replace the alcohol evaporated. After two hours the glutinous matter appeared to be completely transformed, and yellowish white flocks appeared in the liquor. The alcohol having been driven off by evaporation, and the residue taken up with ether, the ethereal solution left upon evaporation a nearly white substance in crystalline scales, resembling, but without being identical with, those of cholesterine. The portion insoluble in ether, treated with water acidulated with hydrochloric acid, gave a white fusible substance, soluble in alcohol and in alkaline solutions.

The alcoholic liquor, which was of a slightly greenish yellow colour, was distilled to remove the alcohol, and the residue treated with distilled water. A yellowish white substance that floated to the surface of the liquid was separated on a filter, washed with water, and re-dissolved in absolute alcohol. It presented all the characters of a resin; it had neither taste nor odour, and by dry heating it yielded a spongy charcoal, and a small quantity of brown acid liquid having an acrid taste. The evaporation of the water left a substance difficult to dry completely and not showing any trace of crystals. Again treated with absolute alcohol, it dissolved completely. The alcohol deposited an amorphous substance, nearly white, with an aromatic odour recalling that of the plant, and a scarcely acid reaction, but presenting none of the characters attributed to caffeotannic acid and noticed in maté, by Rochleder. Caffeotannic acid was also sought for by precipitating an aqueous infusion of maté with acetate of lead, but the result was negative. The preceding substance boiled in water, slightly acidulated with sulphuric acid, developed the markedly aromatic odour of the plant, whilst the solution reduced the cupropotassic liquor freely. After some hours it became strongly coloured, and deposited brown flocks.

The aqueous infusion of 100 grams of maté, slightly acidulated with sulphuric acid, heated and then decolorized by acetate of lead, was dextrogyre.

These characters proved that the substance isolated was a complete glucoside, the decomposition of which yielded glucose and a compound to which the plant owes its characteristic odour.

100 grams of maté, exhausted by a litre of boiling distilled water yielded 24 grams of dry extract. The precipitate produced in aqueous infusions by basic lead acetate was washed with cold water and re-dissolved in boiling water. The filtered solution deposited upon cooling slender crystals of a salt presenting all the characters of malate of lead; particularly those of fusion and of yielding a pitchy mass by the action of a quantity of water insufficient to dissolve it. The tests for tannin gave negative results.

Incineration of the extract yielded a proportion of ash equal to 3·92 per cent. of the maté used. The ash contained carbonate of potash; it was rich in sulphuric acid, and iron was present in weighable quantity.

The 100 grams of maté yielded:—

Caffeine	1·850 gram.
Glutinous substance, or peculiar fatty matter and colouring matter . .	3·870 grams.
Complex Glucoside	2·380 ,,
Resin	0·630 ,,
Inorganic Salts, including Iron . .	3·920 ,,
Malic Acid	Not estimated

The relative proportions of caffeine or theine contained in different sorts of coffee or tea (*Thea Chinensis*) determined by Stenhouse, amounted to 1·37 per cent. in the richest tea, 0·20 per cent. in coffee, and a still smaller proportion in maté. These figures do not agree with those obtained by Robiquet, Payen, and Mulder, and agreement is scarcely possible with specimens from different sources analysed by different methods. But Paraguay tea, analysed by the author as described, contained an amount of caffeine comparable with that in the kinds of coffee and tea richest in that alkaloid.

Maté, or Paraguay Tea. A. Robbins. (*Amer. Journ. Pharm.*, 1878, 274.) A careful chemical examination of various samples of this drug proves the presence of the following constituents:—tannin, 10–16 per cent.; caffeine, 0·2–1·6 per cent.; ash, 5–10·9 per cent., of which 0·3–4·1 per cent. was sand, etc. The tannin forms no precipitate with gelatine, and a green coloration, changing to brown on standing, with ferric chloride.

The following pharmaceutical preparations of maté are suggested by the author:—The simple infusion which is the form in which it is always used in South America; a solid extract, prepared with

alcohol of sp. gr. ·822, and a fluid extract prepared with alcohol of sp. gr. ·941, in such proportion that when finished its weight will be equal to the weight of maté used in its preparation. A considerable quantity of fluid extract, prepared by this formula, has been used in debility and in various derangements of the nervous system, generally with satisfactory results.

The reputed therapeutical properties of maté have been fully stated in previously published papers, some attributing the most deleterious effects to its continued use, and others lauding it to the utmost limit of credibility, almost equalling the marvellous statements made of the action of the somewhat similar substance, coca. In regard to maté, however, the author is fully convinced that it does really possess properties which render it worthy of careful therapeutical investigation.

The thorough desiccation it undergoes in its preparation, and the compact hermetical character of the packages in which it is contained, tend greatly to the preservation of whatever virtues it may have originally possessed.

The Constituents of Liquid Storax. W. von Miller. (*Liebig's Annalen*, clxxxviii., 184, 216.) The first part of the paper is historical, and contains numerous references to the literature of the subject, in addition to a previous communication of the author. The result of the author's researches, contained in the second part of the paper, show that, in addition to styrolene, cinnamic acid, and styracin, storax, contains:—

1. *Phenylpropyl cinnamate* in considerable quantities.
2. *Ethyl cinnamate* in small quantities.
3. A body which smells like *vanillin*, and forms a crystalline compound with sodium bisulphite. This body melts at 65°, and may possibly be ethylvanillin. It occurs in small quantities.
4. A resinous body which accompanies the last in small quantities. Its composition has not been determined.
5. Two alcoholic bodies (α- and β- storesin) in very considerable quantities.
6. Compounds of these bodies with cinnamic acid, also in considerable quantities.
7. A sodium compound of storesin in very small quantities.

Storesin (from storax and resinæ) is the name proposed by the author for the body obtained from the residue left on extracting refined storax successively with caustic soda, cold alcohol, cold petroleum naphtha, hot petroleum naphtha (using an upright condenser). It melts between 160° and 168°, and has the composition $C_{36}H_{58}O_3$.

Sanguinaire, or Thé Arabe. J. R. Jackson. (*Pharm. Journ.*, 3rd series, viii., 521.) This tea is recommended for use more as a medicine than as a refreshing beverage. It is prepared at L'Arba, in Algeria, but is also sold in Paris, by M. Hugot, 19, Rue Vielle-du-Temple, as well as by all druggists. It is neatly done up in packets, on the front of which is a description of its virtues in French, and a similar description occurs on the sides in English, German, Italian, and Arabic. The English description is as follows:—

"*Algerian Tea.*—The plant which is used to make this preparation grows on the arid slopes of the Atlas Mountains. The flowers and some of the small leaves are dried, and the infusion made from them has a pleasant taste, and is decidedly beneficial in its action in all cases of colds, catarrhs, and chest affections. Algerian tea is exceedingly useful in alleviating fevers and in contributing to the enrichment of the blood. It is much recommended to persons suffering from a feeling of oppression at the chest, or from any difficulty of digestion. Its daily use after meals gives tone to the organs, and regulates all the functions of the body. A teaspoonful is sufficient to make a breakfast cup of the infusion."

With regard to the medicinal properties, if any, of this tea, the author is unable to give an opinion, but so far as its "pleasant taste" is concerned, his experience of a teaspoonful in a breakfast cup of boiling water, as directd, resulted in an infusion with scarcely any colour and but very little smell, reminding him rather of boiled hay. The flavour, which was not very marked, was herby rather than aromatic. As found in the packets, this tea is composed simply of what at first sight seems to be the flower-heads of a species of *Helichrysum*, or some allied composite; but upon closer examination the large silvery bracts are found to belong to the flowers of a species of *Paronychia;* and upon still closer examination and comparison, the species appears without doubt to be *Paronychia argentea*, Lam., a plant widely distributed through the Canary Islands, Spain, and the Mediterranean region. Though the name of the plant furnishing this tea is not referred to on the packet, a private letter that accompanied the sample forwarded to Kew, states that two species of *Paronychia* are used, namely, *P. argentea* and *P. nivea*, and that the term, "Thé Arabe," by no means distinguishes this particular kind, inasmuch as it is given also to infusions of *Globularia Alypum*, *Cistus albidus*, and *Verbena triphylla*, or *Aloysia citriodora*.

Rheum Palmatum, var. Tanguticum. Prof. Balfour. (From the Transactions of the Botanical Society of Edinburgh.) The

author has received from Mr. G. P. Regel, Director of the Botanic Garden at St. Petersburg, five young rhubarb plants, under the name of *Rheum palmatum*, var. *Tanguticum*. The plant was collected by Lieut.-Colonel N. Prejevalsky, on the north-western range of mountains of Mongolia, in the Tangut country, and in the solitudes of Northern Thibet. It is rare in the environs of Chertinton, but is said to abound near the source of the Tatung and Etsina, farther to the west. It is known to the Mongols as "shara-moto" or yellow tree, and to the Tangutans as "djumtsa." The leaves of the plant are described as large, sometimes two feet long by three feet broad, and resemble those of *Rheum Palmatum*, which has been cultivated in the Botanic Gardens since the time of Dr. John Hope, Professor of Botany in Edinburgh, and who read a paper on the subject to the Royal Society. The leaves, however, differ from those of *R. Palmatum*, in being covered with longish stiff hairs.

The flower stalk is said to attain a height of from seven to ten feet, with a thickness of half an inch near the ground. It does not branch as in ordinary rhubarbs, but is more compact, the flowering branches coming off at a very acute angle, and running parallel to the stalk, as shown in the figure in the colonel's book. The root when fully grown is said to be about a foot long, and of the same thickness. The flowering time is the end of June or beginning of July, and the seeds ripen towards the end of August.

The Tangutans and Chinese dig it up in September and October. It is transported by land in winter, and by boats in summer down the Hoang-ho to Pekin, Tientsin, and other ports, where the Europeans buy it, paying more than six or ten times its value at Sining.

The plant is quite distinct from *Rheum officinale*, which has lately been introduced into European gardens as the true rhubarb of commerce. According to Lieut.-Colonel Prejevalsky, the plant yields the Kiakhta, or Khan-su rhubarb. Professor Maximovitch states that the dried roots (about 36 lbs.) brought home by the colonel, after having been carefully analysed and tested by Russian chemists and physicians, entirely agreed with the best Kiakhta rhubarb, both in internal structure and in the number of crystals of oxalate of lime, the quantity of extract obtained from the root, and in the medicinal effect of the powder and other preparations.

Acclimatization Experiments. (From the Annual Report on the Progress and Condition of the Royal Gardens, Kew; *Pharm. Journ.*, 3rd series, viii., 30.)

"*Balsam of Copaiba.*—Some well-ripened seeds of the Para Copaiba (*Copaifera Multijuga*) have been brought by Mr. Cross from

the forests of Para, and germinated freely. The tree which produces it is described as gigantic, the trunk sometimes rising to a height of eighty feet before branching. The Para balsam, called *Copaiba blanca*, is chiefly sent to France, where it obtains the highest price of any. A single tree, if tapped at the right season, is said to yield about eighty-four imperial pints of balsam. Very little is known of the history and botanical characters of this plant, which has been only imperfectly described. It is greatly to be desired that this tree should be introduced into the East Indies.

"*Balsam of Peru.*—This beautiful tree (*Myroxylon Pereiræ*) was introduced into Ceylon in 1861 by the exertions of the late eminent pharmacist, Daniel Hanbury. It has succeeded there admirably, and Dr. Thwaites speaks in warm terms of the beauty of its foliage and habit.

"*Ipecacuanha.*—Dr. King reports that he fears this drug cannot be grown profitably so far north in India as Bengal; but that the secret of its successful propagation being now perfectly understood, any quantity of seeds can be sent out. A quantity of the dried root has been prepared by Dr. King for use in the Medical College Hospital of Calcutta, and found to be quite as efficient as the best South American drug. The disadvantage attributable to the extreme slowness of the growth of this plant, and hence small annual return of root wherever it has been cultivated, must be met by a greater extension of the cultivation, as to which there should be no difficulty, seeing that the plant is increased with astonishing facility by ordinary cuttings, root division, or by merely pegging a leaf to the earth.

"*Castor Oil in Bahamas.*—A correspondence has taken place with the Colonial Office on the subject of the cultivation of the castor oil plant in the Bahamas. Governor Robinson states that 'the castor oil plant grows here as a weed, but no endeavour yet has ever been made to express the oil. Thousands of gallons might be exported from here annually.' A supply of the best castor oil seed was obtained from Calcutta and forwarded to the Bahamas. Governor Robinson now reports: 'The yield of this variety of the castor oil plant is, we should say, fully three times greater than that commonly found amongst us, the heads and the beans themselves being very much larger than those produced by the native variety. As the East India plant can be cultivated quite as readily as our own, and as it possesses such a marked superiority in the matter of yield, we hope to see it speedily and widely introduced into the colony, so as to supersede the indigenous kind altogether.'

"*Burmese Cardamoms.*—A sample of these seeds was sent to Kew by the Indian Office for identification. Burmese cardamoms fetch a low price in the market compared with Malabar cardamoms, and it was supposed that this might be due to the intermixture of the seeds of this plant with those of a spurious kind. It was, however, quite certain from their microscopic structure that the seeds sent were not those of *Elettaria cardamomum*, and it was not improbable that they might belong to *Amomum xanthioides*, the wild cardamom of Siam, but about which scarcely anything is known. In this, as in so many other cases, the materials sent to Kew for an opinion were from a botanical point of view lamentably insufficient; and this was in this particular instance the more to be regretted, because a scientific department like the India Forest Service might easily obtain such a series of specimens for transmission to England as would enable the whole history of the Burmese cardamom, which at present is very unsatisfactorily known, to be entirely cleared up."

With regard to the *Cinchona Cultivation in St. Helena*, Sir Joseph Hooker says:—"In my report for 1874 I pointed out that 'the suitability of the soil and climate of that island for cinchona cultivation has now been indisputably proved.' It is a melancholy conclusion to the efforts made by Kew on behalf of this doubtless dispirited, but I am afraid I must add, spiritless colony, that nothing has been done to utilize so easy a source of revenue. In a private letter recently received, I am informed that 'up to within a few months since a man was paid by the colony to look after the cinchona plants on Diana's Peak, but even he has been disestablished, and the plants are overgrown and almost hidden in ferns and dense undergrowth of native vegetation.'"

The report, which deals largely with other plants of economic value, will be found of more than usual interest.

Examination of Commercial Specimens of Scammony. C. Govaerts. (*Journ. de Pharm. d'Anvers*, April, 1878.) There still appears to be a good deal of inferior and adulterated scammony in the market. From a number of analyses the author has made, he publishes the result of three, showing the great variation in the quality of this article as met with in commerce:—

	Aleppo Scammony. (good).	Ordinary Scammony.	So-called Aleppo Scammony.
Resin	85	20	8
Gum	4	10	3
Starch	0	63	75
Mineral Matters	11	7	14
	100	100	100

Conium Seed as an Admixture of Anise Seed. A. Poehl (*Pharmaceut. Centralhalle.*) This dangerous admixture has been repeatedly observed by the author in Russian anise seed, and may be detected by careful inspection with the aid of the microscope, or by liberating conine by heating with sodium hydrate.

Costus. M. C. Cooke. (*Pharm. Journ.*, 3rd series, viii., 41.)

Botanical Origin.—*Aplotaxis auriculata*, D. C. (*Auckland costus*, Falc.), is a composite plant inhabiting the north-western Himalayas. According to Stewart it grows at an elevation of from 10,500 to 13,000 feet, in parts of the basins of the Jhelam and Chenab. Under the name of *Saussurea hypoleuca*, Spr., it is included in Clarke's "Compositæ Indicæ," and is said to extend from Sikkim to Kashmir at an elevation of from 7000 to 12,000 feet. The "koot" or "costus" root of which we have any knowledge at the present day has no relation whatever to the plant *Costus speciosus*, Sm., or *Costus Arabicus*, Linn., with which it is sometimes confounded. Dr. Falconer was the first to trace the drug to its true source; and although Dr. Royle at one time seems rather to have considered it the produce of an umbelliferous than a composite plant, there appears to be no ground for the suspicion.

Native Synonyms.—The native names determined by Surgeon Mooden Sheriff are: *Qust.*, Arab.; *kosht*, *kost*, Pers.; *pachak*, *kut*, Dukh.; *goshtam*, Tam.; *goshtamu*, Tel.; *koshtam*, Sans. It is the *orris root*, *patchuck*, *putchuck*, or *ooplates* of the trade lists and returns, and the *pachak* of Bengal. In China it is known as *muh-hiang* and *kwang-muh-hiang*.

History.—Costus was well known to the ancients, and the account given of it by Dioscorides is to the effect that "Arabian costus is best; it is of a white colour, and light, and emits a very grateful and sweet odour. Indian costus holds the second rank; it is thick and light, like ferula. The third sort is the Syrian, which is heavy, in colour like boxwood, and emitting a strong odour. The best costus is that which is fresh, light coloured, compact, and of firm texture, dry, not worm-eaten, devoid of an acrid smell, and which tastes hot and biting."

The Persian Hukeems have founded their account of costus upon that of Dioscorides. In the "Toftehool-moomineen," cited by Falconer, it is stated that, "Koost is a root resembling in appearance that of the mandragora, and comes from the borders of Hindoostan. The plant which yields it is humifuse and stemless, and has broad leaves. There are three sorts; the first, called Arabian or ocean *koost* (*koost Arabee* and *koost buhree*), is sweet, light, white, and

fragrant. The second, called Indian koost, is of a dirty yellowish colour, light, thick, bitter to the taste, and having but little fragrance. The third is of a dirty red colour, and heavy, and in weight (or colour) like boxwood, and fragrant, and without a bitter taste. What follows refers to the first sort, or sweet koost. The best is what is fresh, white, not worm-eaten, and having a hot, biting taste. It retains its virtue good for four years; and the difference between it and elecampane (*rasun*), or Damascus koost, is in this, that elecampane is harder, and has not the fragrant odour and biting taste of koost. Koost is hot and dry in the third degree; it is diuretic, revulsive, emmenagogue, hepatic deobstruent, a universal antidote to animal poisons, attenuates the secretions, a powerful aphrodisiac, vermifuge, lithonotripic, etc., etc."

Description.—The root as met with in the bazaars consists of irregular pieces from two to three inches in length, and scarcely an inch in diameter, cylindical, with a rough and somewhat reticulated surface, and very compact and brittle. Internally it is dirty white, with radiating bundles having numerous small cylindrical channels filled with a brownish resin. There is no distinct bark or central medulla. When cut or rubbed it has a strong and definite odour resembling that of violets or orris root. In taste it is at first camphoraceous, and then bitter with a slight pungency, but by no means unpleasant. The genuine root does not appear to be at all subject to the attack of insects, although fragments of foreign roots introduced as adulterations are nearly destroyed. Of the two varieties of root, that called *kut tulkh* is probably the old, and *kut shirin* the young root. Dr. Stewart hazarded the opinion that *kut shirin* is the produce of a different and unknown plant. Two specimens collected in Kashmir under the names respectively of *tet khot* and *muder khot* do not appear to differ except in size.

Composition.—Hitherto we have found no record of any chemical examination of this root, although it is one which certainly offers many points of interest. At present our own microscopical examinations have been very superficial, sufficient only to show that starch only exists in very small quantities, and of a character quite different from that of the false root hereafter alluded to.

Collection and Preparation.—The roots are dug up in the months of September and October, when the plant begins to be torpid; they are chopped up into pieces from two to six inches long, and exported without further preparation. The quantity collected is very large, amounting, as far as Dr. Falconer could learn, to 10,000 or 12,000 khurwars (of 192 pounds), or about two million pounds, per annum.

The commodity is laden on bullocks and exported to the Punjab, whence it finds its way to Bombay, and a portion gets to Calcutta through India. In Dr. Falconer's time the cost of collection and transport was about half a crown per hundredweight.

Commerce—The Sanscrit name (*kashmèrja*) of the root indicates the chief place whence it was brought. Cleghorn states that it is also exported from Pangi, on the upper Chenab, to the plains. The loads of it when passing scent the air to some distance. A great part of the imports into the Punjab pass through to be sent to China. Davies' "Trade Report" gives twenty maunds as exported to Afghanistan *viâ* the Bolan. Royle mentions that in one year (1837–8) 6697 maunds of this root, valued at 99,000 rupees, were exported from Calcutta to China; and in 1867–8, 347 cwt., nearly 10,000 maunds, were exported from Calcutta to China. In Kashmir territory the Maharaja is said to take it over from the collectors at half the price at which he sells it again. In 1864 his income from this source was put down on good authority (according to Dr. Stewart) at 300,000 chilki, equal to nearly 190,000 rupees; but this, he adds, is scarcely credible. Koot is imported into Leh in small quantities from Kashmir for exportation to Lhassa, where it is called, as well as by the Bhotes *rusta*, and is used for incense. In 1871, 33 maunds were imported into Leh from Kashmir, valued at 672 rupees. According to Dr. Falconer, at the time he wrote the cost of collection and transport to a depôt at Kashmir was 2*s*. 4*d*. per cwt.; on entering India its value was enhanced to from 16*s*. 9*d*. to 23*s*. 4*d*. per cwt., whilst the commercial value at Canton was 47*s*. 5*d*. per cwt., an immense increase upon the cost in Kashmir. As this drug is not enumerated in the recent trade returns of Bombay or Bengal, the amount of exports cannot be ascertained.

From the consular reports we find that in the year 1875 the imports of costus into two Chinese ports only were,—for Hankow, 1270 piculs, valued at £5224 6*s*. 3*d*.; and Chefoe, 277 piculs, valued at £1197; so that it is clearly no insignificant article of Chinese commerce.

Uses.—Dr. Irvine states that formerly, when opium was not produced in Rajwarra, this root was extensively smoked as a stimulant. He adds that it is said to be narcotic when thus used, and that formerly great quantities went to China for smoking purposes. At the present time it is chiefly used as a perfume as a protection of bales of cloth from insects. In the Punjab it is applied in powder to ulcers, for worms, for wounds, and for toothache; and it is also given in rheumatism. Locally it is used also for hair powder.

Assistant-Surgeon Rahum Khan says that it acts as a diuretic, emmenagogue, absorbent, and as an antidote for animal poisons. It also acts as an aphrodisiac and anthelmintic. He adds also that it is a good tonic for the liver and stomach. A summary of the uses of this drug is given by Baden Powell in his "Punjaub Products," in the following terms:—

1. Dried and powdered as the principal ingredient in an astringent stimulant ointment, applied to severe ulcerations.

2. Dried and powdered as a hair wash.

3. As a stimulant in cholera, an infusion is made of cardamoms, 1 dram; fresh "kut," 3 drams; water, 4 ounces. One ounce every half-hour. It is doubtless a powerful aromatic stimulant, and would be serviceable in any spasmodic disease.

4. It is universally employed by the shawl merchants as a mechanical protector of Kashmir fabrics from the attacks of moth and other vermin.

5. The dried root is an agreeable fumigatory, and yields excellent pastilles, which burn fairly.

6. It is exported in enormous quantities to China, where it is used as an incense. Lines of camels may often be met passing down to Multan, the "kut" perfuming the air for a considerable distance; it is found in every hong; no mandarin will give an audience until the "pachak" incense smokes before him; in every joss house it smoulders before the Tri-Budh deity; in every floating junk in the Chinese rivers, the only house of countless hordes, Budh's image is found, and the smoke of the "pachak" religiously wends its way heavenward. With the bulk of the Chinese this ceremony is regarded as sufficient to propitiate the gods, while their merchants by substituting a spurious pungent article endeavour even to mephitize their frowsy deity.

7. It is a Crown monopoly; each village in the vicinity of the "kut" fields is assessed at a fixed amount yearly, which must be delivered in the capital; the Maharajah's agents buy up the surplus at one maund per chilki rupee, and retail it at double price.

As to its uses in China, Dr. Porter Smith says that it is used in making incense in the south, or to preserve clothes from the attacks of moths and other insects. It is said to have the power of turning grey hair black. Carminative, stimulant, antiseptic, prophylactic, astringent, sedative, and insecticidal properties are referred to this remedy. The Chinese apply it with musk, which it resembles in odour and properties, to aching teeth.

Substitutes.—The Kashmirs say that this drug is apt to be adul-

terated with five or six other kinds of roots. Dr. Birdwood remarks that the root of a plant with the native name of *poshkar*, believed to be a species of *Ligularia*, is used for adulterating *koot*, and the Kashmirs at Lahore make the same statement A sample of false costus in the Indian museum, under the name of *kutmitha*, consists of pieces of a cylindrical root, from one to three inches in length, and from half to one and a half inches in thickness, externally nearly smooth, or longitudinally striate, with transverse paler scars. It is much lighter and less compact than costus, friable and farinaceous internally, very much subject to attacks from insects, with little or no apparent odour or taste, and containing a large quantity of starch, the granules of which are very variable in size, attached to each other in twos and threes. Although sometimes called "orris root," and so named in some of the trade returns, costus must not be confounded with the rhizomes of *Iris*, which are also to be met with in India and other Oriental countries, and are the true "orris root," though perhaps the produce of a species of *Iris* differing from *Iris florentina*.

Costus is also said to be much adulterated with cow-dung, and with a root called *thooth*, which closely resembles the genuine article, and is believed by Dr. Thompson to be the root of *Salvia lanata*. According to Mr. H. Cope, of Umritsur, two other substances resembling custos in external appearance have been ascertained to serve as ingredients in the mixture sent to Calcutta and Bombay for exportation to China under the name of *putchuk*. They are a root called *chog*, brought from the hills, which is generally reported to be a deleterious drug; and *nirbisi*, the root of a species of *Aconitum*, probably a virulent poison.

Bibliography.—The following are some of the works which may be consulted on this subject. Rhases "Cont.," i. ult. i. 236; "Avicenna," ii. 2, 161; "Serapion," c. 318; Pliny "Hist. Nat.," xii. c. 24; "Columella," xii. 20; "Propertius," vi. 5, 6; "Lucan," ix. 917; Horace, "Carm." iii. 1, 44; Ovid "Met.," x. 368; "Dioscorides," lib. i. c. 15; "Paulus Ægineta" (Syd. Soc.), iii., 190; "Pharmacopœia of India," p. 127; Falconer in "Linn. Trans.," xix., p. 23; Irvine "Med. Topog. Ajmeer," p. 107, 142; Royle "Illustrations," p. 360; Guibourt "Hist. Drog.," iii. 28; Royle "Antiq. Hind. Med.," p. 699; Ainslie "Mat. Med.," ii. 166; Birdwood "Bomb. Prod.," p. 48; O'Shaughnessy "Beng. Disp.," p. 652; *Pharm. Journ.*, series 1, vol. i., p. 575; Stewart's "Punjab Plants," p. 122; Porter Smith's "Chinese Materia Medica;" Powell's "Punj. Prod.," p. 356; *Journ. Agri. Hort. Soc. India* (1859), vol. xi., part 1, p. lxxvi.

(1860); vol. xi., part 3, p. 3; "Abu Mansur Mowafik" (edit. Seligmann) part ii., p. 66; Simmonds "Comm. Prod.," p. 438; Hanbury "Chin. Mat. Med.," No. 101; Honigberger "East," p. 262; Pomet "Hist. of Drugs" (1737), p. 32.

Note on Costus. Prof. F. A. Flückiger. (*Pharm. Journ.*, 3rd series, viii., 121.) The author supplies some interesting information on this subject, as an addition to the previous article by Mr. Cooke. It appears that long before the period of Dioscorides, costus was already mentioned as a spice by Theophrastus, about the end of the fourth or the beginning of the third century, B.C. It also occurs in the offering made, B.C. 243, by Seleucus II., King of Syria, and his brother Antiochus Hierax, to the temple of Apollo at Miletus (see "Pharmacographia," 467).

Respecting its microscopic structure, Professor Flückiger says that the tissue of the root abounds in *inulin*, and shows, especially in the bark of the branches of the root, large *balsam-ducts*. In both these respects costus root agrees well with elecampane and other aromatic roots of *Compositæ*. The microscope, therefore, affords further evidence of the correctness of Falconer's suggestion, that costus is derived from *Aplotaxis*, at least inasmuch as *inulin* is not to be met with in any other natural orders than in *Compositæ* and a few allied orders, viz., *Campanulaceæ*, *Goodeniaceæ*, and *Stylideæ*. Starch is usually wanting in these plants, and none is found in costus.

Externally costus root likewise reminds of elecampane, although it is much more woody; curiously enough, Dioscorides already alluded to this fact, pointing out that elecampane from northern Syria (Kommagene) might be substituted for costus.

The chemistry of elecampane is far from having been satisfactorily investigated; but as it has already afforded interesting information, Professor Flückiger thinks it would be well worth while also to submit the costus root, the elecampane of the East, to chemical examination.

Report on the Cinchona Cultivation in Java. (*Pharmaceutische Zeitung*, 1877, No. 71; from *New Remedies*.) By order of the Government, of May 28, 1877, the director of the plantations was authorized to plant an additional million of cinchona trees. A portion of the bark-harvest of 1876, consisting of 146 chests and 337 bales, was sold by auction at Amsterdam on April 17th last. The prices obtained were unusually high, the average being, for a half kilo, or one pound, as follows:—

	Crop of 1875.	Crop of 1876.
Cinchona succirubra . .	$0·54	$0·56
,, Calisaya Javanica .	0·60	0·96
,, ,, Schuhkraft	0·51	0·75
,, ,, Ledgeriana	1·50	3·43
,, officinalis. . .	1·00	2·44
,, Hasskarliana. .	0·58	0·93
,, caloptera . .	—	0·61
,, mixed pieces . .	—	0·55
,, powder . .	0·15	0·32

During the last months of 1876 the cinchona trees have suffered a great deal from rot, which has been ascertained to be due to the ravages of a hemipterous insect, the same which infests the tea-plant, namely *Heliopeltis thievora*. Both the adult winged, as well as the young unwinged individuals, feed upon the sap of the young leaves and bark. For this purpose they puncture the epidermis by means of their proboscis in a great number of places, whereby the leaf or bark acquires a spotted look. In the course of time the uninjured parts of the leaf or bark continue to grow, while the punctured portions shrivel up and die off. In consequence thereof the leaves and ends of the branches assume a twisted shape, and gradually become dark coloured, until new shoots make their appearance from the apparently dead parts. This insect is only found upon introduced plants, such as tea, cinchona, fuchsia, and a species of datura; it has not yet been met with upon plants indigenous to Java. Their destruction is a task of great difficulty, and probably impossible. The best means of getting rid of them are the early removal of the diseased leaves and branches, and the assistance of the birds inhabiting the plantations, against the annoyance or killing of which stringent laws have been enacted.

Note on the Active Principle of Canabis Indica. Prof. G. Dragendorff and Dr. Marquiss. (*Pharmaceut. Zeitung*, 1877.) The authors doubt Dr. Preobrachensky's assertion that nicotine is the active principle, or at least the normal constituent, of *Canabis Indica* (see *Year-Book of Pharmacy*, 1877, 213), because the therapeutic effects of this drug are so essentially different from those of tobacco. They are inclined to attribute Dr. Preobrachensky's results to a contamination of the Indian hemp operated upon, either with tobacco or some other plant yielding a volatile alkaloid.

Chemical Examination of Triticum Repens. M. Plauchud. (*Zeitschr. des oesterr. Apoth. Ver.*, 1877, No. 29.) 100 parts of the dry plant yield about 65 parts of flour of an agreeable odour and

taste, which is well suited for cattle food. 100 parts of the flower were found to contain :—

Crystallizable Sugar	3	parts
Uncrystallizable Sugar	4	,,
Starch	13·9	,,
Fat	1·115	,
Nitrogen	1·45	
Mineral constituents	3·25	
Lignin and other substances	73·285	,,

Comparative Examination of Thapsia Garganica and Thapsia Silphium. M. Yvon. (*Journal de Pharm.* [4], xxv., 588; *Pharm. Journ.*, 3rd series, viii., 162.) M. Henricq claims to have demonstrated that an Algerian plant, to which the name *Thapsia Silphium* had been given, and which was alleged to be the source of the silphion of the ancients, was identical with the *Thapsia Garganica* of Europe. Admitting this as proved, M. Yvon thought it would be interesting to examine whether the growth of the same plant in different latitudes affected its ultimate composition.

Exposed to prolonged heat in a stove, the root bark of *Thapsia Garganica* lost 12·93 per cent. of water; that of *Thapsia Silphium* lost 17·35 per cent. The dried substance gave the following results upon analysis :—

	T. Garganica.	T. Silphium.
Organic Matter.	91·24	90·26
Starch	22·510	26·124
Gum	5·179	5·421
Gum-resin	5·759	4·271
Resin	2·554	3·192
Albumen	1·354	0·624
Inorganic Matter.	8·76	9·74
Lime	1·365	1·368
Magnesia	0·677	0·697
Iron	0·370	0·224
Albumen	0·338	0·508
Sulphuric Acid	0·297	0·300
Phosphoric Acid	1·468	1·919
Chlorine	0·219	0·420
Silica	2·715	0·707
	100·00 100·000	100·00 100·000

An examination of this table shows that there is a considerable concordance between the mineral constituents of the plants dried at 100° C., and almost as great in the organic constituents, the quantity

of resinous matters being nearly the same. Inquiries directed to ascertain what influence the nature of the soil might have, brought out the fact that in Algeria the plant grows equally well in all soils. In consequence of the presence of resinous matters, the author does not speak decisively as to the existence of an alkaloid in the plant.

Examined under the microscope, the starch of the two kinds appears to be similar, except as to size; that of the *T. Silphium* varying in diameter from $0^{m}{\cdot}004$ to $0^{m}{\cdot}015$, and that of *T. Garganica* from $0^{m}{\cdot}006$ to $0^{m}{\cdot}026$.

Although the amount of resin obtained from the two plants was so nearly the same, it differed considerably in activity. During the extraction of the resin from the root bark of the *T. Silphium*, which was done by exausting it with 99° alcohol after previous treatment with 60° alcohol, there was given off a peculiar, not unpleasant aromatic odour, that was not observed with the *T. Garganica*. The activity of the silphium resin, however, was found to be excessive. In spite of all precautions a stay in the laboratory during the evaporation of the alcohol produces a rather painful sensation of heat, which afterwards became localized in the nostrils, eyelids, and especially in the neck behind the lobes of the ears. After twelve hours of intolerable itching at these points, a very intense miliary eruption took place, together with swelling of the eyelids and finally desquamation. The work was therefore dropped for two months, but the same symptoms followed a renewal of it. Even contact of the fingers with the resin produced the symptoms, notwithstanding immediate washing with alcohol and soda. A curious point is that no inconvenience was experienced in the hands and arms. Nothing of the kind occurred during the manipulation of the garganica resin.

The Use of Lythrum Salicaria. Dr. Campardon. (*Bulletin général de Thérapeutique*, 1878.) An infusion of the leaves of this herb is a popular remedy for dysentery among the peasants in the environs of Lyons. The author obtained a quantity of the leaves, and had an extract and a tincture prepared from them. He found them of service in dysentery, acute and chronic diarrhœa, etc. Their action is astringent and tonic.

Quinchonchos. T. F. Hanausek. (*Zeitschrift des oesterr. Apoth. Ver.*, 1878, No. 5.) This drug is known as *embrevade* or *Angola peas*. The Indian bean-bush or wool-bean is a papilionaceous plant, native of East Indies, but cultivated in tropical America. The seeds resemble peas, being, however, only about half the size, and somewhat flattened on one side; the colour is dirty greyish yellow, with a few small, irregular, dark brown spots, particularly near the

hilum. They are chiefly used as food; the root and twigs are said to be used medicinally in eastern Asia.

Java Rhubarb. Prof. Husemann. (*Pharmaceut. Handelsblatt*, 1877, No. 94; *Pharm. Journ.*, 3rd series, viii., 328.) Upon the Gunung Unarung and other mountains in Java there grows, at an elevation of two thousand to four thousand feet, a species of *Rheum*, the root of which forms an article of commerce, and is used by the Javanese as a purgative under the name of *akar kelomba*. Three varieties of this drug are met with in commerce: (1) *akar kelomba bras*, the top part of the root, with fragments of stalk still adhering; (2) *akar kelomba ketan*, the middle portion of the root; and (3) *akar kelomba keteba*, the bottom portion. Of the three the second named kind is the most valuable, whilst the top portion of the root, combined with fragments of stalk, is of least value.

A detailed description of the best kind of Java rhubarb has been given by J. H. Schmidt, in the *Tydschrift Nederlandische Inde* (xvii., 98), according to which the root is fleshy, and long conical, or somewhat napiform. In some places it is still covered with a dark drown rind, whilst the remainder is peeled, and appears marbled with white and red. In a transverse section the rays run from the centre to the circumference, traversing the concentrical red coloured rings, and appearing to break off at the cambium, which forms a dense dark brown resinous looking layer from 1·1 to 1·5 millimetres thick. The most central concentric rings are bright red and alternate with yellow ones. At the centre, in some fissures resulting from the drying, are seen some fine white felt-like threads, having a silky lustre; the structure of these can be recognised under the microscope. In a longitudinal section are seen in the centre the almost rectangular parenchyma cells, partially filled with chrysophanic acid. With the aid of a glass, cells containing crystals of oxalate of lime can be detected.

The Java rhubarb resembles the Chinese in smell and taste almost completely; but according to some experiments made by Dr. V. Vogelpoel, its activity is one-fourth less.

In 1874, Schmidt brought under the consideration of the Dutch East Indian Government the advisability of experimenting whether it was possible to increase the activity of this species of *Rheum* by cultivation, and thus to obtain a drug equal to the Chinese rhubarb but very much lower in price. The plant appears to be very abundant in Java, and the best kind of root, the *akar kelomba ketan*, is sold there at about 1*s.* 8*d.* per kilogram. As the therapeutic value of the Chinese rhubarb root increases, within certain limits, with

the age of the plant, even if the experiment be carried out it will be some years before the result is known, but it would be possible in this way to secure roots of one age instead of a mixture of roots of all ages as at present.

The comparative analyses carried out by Schmidt between the official rhubarb and the best Java rhubard show, however, some differences; and raise a doubt as to how far the Java root possesses the tonic properties of Chinese rhubarb.

In the first place, the amount of ash differs. Calcined in a platinum dish, the official rhubarb gave 12·15 to 12·24 per cent. of ash, the Java root yielded 6·27 to 6·91 per cent. A more detailed representation of the proportion of the inorganic constituents is given in the following table, in which, unfortunately, oxalic acid does not appear, the analyst having been prevented from completing the estimation :—

	Radix Rhei officinalis.	Radix Rhei Indicæ Javanicæ.
Ca	46·80512	41·68051
Mg O.	4·24359	5·26484
K O and Na O. . . .	7·35024	16·89486
$C O_2$	35·34188	19·25190
$S O_3$	1·11452	2·82191
$P O_5$	5·11709	6·78689
Cl.	0·60683	2·09575
$Si O_3$.	0·59828	1·97869
Carbon and Sand . .	0·76923	2·98934
	101·94678	90·76469

Schmidt has also attempted to estimate quantitatively some of the organic bodies which play a part in the therapeutic action of rhubarb, the result is shown in the following table :—

	Radix Rhei officinalis.	Radix Rhei Indicæ Javanicæ.
	Per cent.	Per cent.
Rheotannic Acid. . .	2·106	0·430
Phæoretin.	0·151	0·090
Chrysophan	0·056	0·107
Chrysophanic Acid. .	4·700	1·646
Emodin	0·580	2·000

From this it would appear that the rheotannic acid and the chrysophanic acid are present in the Java root in much smaller proportion than in the Chinese; whilst crysophan and emodin are

present in larger proportion in the Java root. Although the figures in this table cannot be taken as absolutely correct, in consequence of the great difficulty attending the separation of the organic constituents of rhubarb, it may be assumed that to a degree it is an expression of the differences between the two kinds of rhubarb. If chrysophanic acid be the active principle, then the inferior activity of the Java root depends probably upon the smaller quantity of chrysophanic acid present in it, and the activity might have been still further reduced if it were not for the simultaneous diminution in the proportion of tannic acid, which by its anti-purgative action might act antagonistically to the chrysophanic acid. The author considers it highly probable that the relative proportions of these constituents might be altered by cultivation, so as to approximate the two rhubarbs more closely,

At present no information exists in botanical literature as to the plant from which the Java rhubarb is derived. Rosenthal's "Synopsis Plantarum Diaphoricarum" does not refer to any species of rhubarb growing in Java.

Still the Dutch East Indian botanists ought not to find any difficulty in deciding how far the plant should be treated as a new species or as one of the many continental East Indian species. But certainly this investigation throws no light upon the origin of the true rhubarb root.

Asclepias Syriaca. Dr. H. K. Pusey. (*New Remedies*, 1878, 178, from *Louisville Med. News*, May, 1878.) The author has used this remedy for a number of years in dropsical affections, and desires to obtain the experience of others with it, as the literature of the subject is very limited. He gives it in infusion, and also in the form of powdered bark of the root. It acts as a diaphoretic and diuretic, and in larger doses as a cathartic and emetic. It is also, he thinks, alterative and tonic in its effects. Four cases are reported in the paper. 1. Dropsy from enlarged liver, for which patient was tapped five times in succession, at intervals of three months, and six gallons of fluid withdrawn each time—was cured by the use of silk-weed. 2. A girl of 15, anasarca following variola; skin had ruptured from over-distention. Infusion of half an ounce of silk-weed in two pints of water, taken in forty-eight hours. Breathing relieved in twenty-four hours; well in one month. 3. Woman, age 82, organic heart-disease, dropsy of legs, chest, and abdomen. Great relief followed use of silk-weed. Died of pneumonia two years later. 4. Negress, age 56; ascites; skin over lower extremities had burst. Restored to health after some months through use of silk-weed.

The Constituents of Drosera Rotundifolia. G. Lucan. (*Journ. de Pharm. et de Chim.*, June, 1878.) 100 grams of the fresh herb were bruised in a porcelain mortar, then enveloped in a loose bag and suspended in a bottle full of ether. After eight hours the bottle contained an upper ethereal layer of a bluish green colour, and a lower aqueous layer of a blood-red tint. These two layers were separately examined and were found to contain chlorophyll, albuminoid substance, yellow colouring matter, wax, acrid corrosive resin, free organic acid, glucose, and mineral matter.

Notes on Casual Drugs. E. M. Holmes. (From a paper read at the Pharmaceutical Society's Meeting, November, 7, 1877; *Pharm. Journ.*, 3rd series, viii., 362.)

Tamarisk Galls.—These small galls came from Mogadore. They vary in size from that of a pea to a horse-bean, or more rarely reach the size of a small nut. The taste is powerfully astringent. Internally they are found to be full of small cavities, in which, however, the insect that forms them is very rarely found in a state to be examined. According to the author, the name of the insect has not yet been determined. The galls contain about 40 per cent. of a very pure tannin.

In Morocco these galls are known under the name of *tacout*, and are produced upon the twigs of *Tamarix articulata*, Vahl. In India similar galls are produced upon *Tamarix Gallica*, L., and *Tamarix orientalis*, Vahl.; those of the former plant are usually rather larger, and are called *bara-mai* in Hindostanee; the smaller ones, from *Tamarix orientalis* being called *chota-mai*. The tamarisk galls of India also occasionally find their way into English commerce, and if better known would probably be largely used for tanning purposes.

A strong infusion of these galls has been recommended in India as an application to foul ulcers, and by the natives they are used in diarrhœa and dysentery.

Calophyllum Inophyllum, L.—The fruits of this plant were imported from the Mauritius under the name of *oil seeds*. The fruits as imported consist of the hard, woody endocarp. They are about the size of an English oak gall, nearly globular, with a small projecting point at one end, and contain a yellowish white oily kernel. According to the official report of the products in the Indian Museum, the seeds yield 60 per cent. of a fragrant green oil, fluid at ordinary temperatures, but beginning to solidify when cooled below 50° F.

In India it is used as a lamp oil, and also as an outward applica-

tion for rheumatism. Although apparently unknown in the commerce of this country, in 1847–8 nearly 4000 gallons of the oil were exported from Madras to Ceylon and the Straits Settlements. The tree yielding these seeds bears handsome white fragrant flowers, and it may not be out of place here to remark that there is a wide field for experiment among the native plants of India for those interested in perfumery.

The author's report contains a note extracted from Seemann's "Flora Vitiensis," showing how highly the oil obtained from these nuts is esteemed in Fiji, as well as the method of extraction. (See *Pharm. Journ.*, 363.)

Boomah Nuts.—These are the fruits of *Pycnocoma macrophylla*, Benth., a small tree belonging to the *Euphorbiaceæ*. These fruits were imported from Natal under the name of galls, probably on account of their bearing a strong resemblance to Aleppo galls in shape and size. Externally they have a black colour, and when broken open exhibit a hard three-celled endocarp, each cell containing a single seed. The seeds in shape and colour are not unlike castor oil seed, but are less than half the size, and have no appreciable taste.

The boomah nuts are said to be used for tanning in Natal. The tannin is contained in the outer coat or sarcocarp, and must be very small in amount, considering the size of the fruit, since so large a portion is occupied by the woody endocarp. These nuts are not likely, therefore, to be able to compete in this country with other tanning materials.

Barosma Ericifolia, Andr.—This drug is a species of buchu leaves. The leaves are very small, resembling in size and shape the leaves of the heath, whence the specific name. The odour of the leaves is powerful, but differs somewhat from that of the official species, having a slight resemblance to the odour of caraways. These leaves are used by the Hottentots in the same way as the official kind, and also as a perfume, and in the form of a tincture as an application to wounds.

Empleurum Serrulatum, Ait.—The leaves of this plant are mentioned in "Pharmacographia" as being offered for buchu in this country. The characters pointed out in that work render it an easy matter to distinguish it from the leaves of *Barosma serratifolia*, Willd., the species which it most closely resembles. One feature, however, not noted in that work, is very easily observed. When a leaf of *Barosma serratifolia* is held up to the light, the lateral veins are seen to be much straighter, longer, and more strongly developed than in the leaves of *Empleurum serrulatum*.

Loomoonderfall.—The large fruits which bear this name were imported from Zanzibar, and are possessed of properties similar to those of *cocculus indicus*. The name of the tree producing them is not known.

Cassia Tora, L.—These seeds were imported under the name of *fantupa seed*. They are about the size of an apple pip, greenish brown, polished, pointed at one end, and irregularly angular. The leaves of this plant are used in India for ringworm, and the seed of another species (*Cassia absus*, L.) has been used in purulent ophthalmia, but the object with which the seeds of *C. Tora* were sent to this country is not known.

The Various Oils of Turpentine. Dr. R. Godeffroy. (*Pharmacent. Zeitung*, 1877, No. 81.) The author gives the following characteristics of the various turpentine oils met with in the European market:—

Austrian Oil of Turpentine, from *Pinus Austriaca*, transparent, colourless, or slightly yellowish; sp. gr. ·864; boiling point, 155°–157° C.; turns polarized light to the left.

German Oil of Turpentine, from *Pinus sylvestris*, *P. abies*, *P. vulgaris*, *P. picea*, and *P. rotunda*; resembles the former; sp. gr. ·86–·87; boiling point, 155°–160° C.; lævogyre.

French Oil of Turpentine, from the turpentine of *Pinus maritama*, colourless or faint yellowish; sp. gr. ·86; boiling point, 156°–157° C.; lævogyre; odour peculiar, taste burning. French turpentine is chiefly produced in the neighbourhood of Bordeaux, and yields 25 per cent. of oil.

Venetian Oil of Turpentine, from American turpentine of *Pinus palustris* and *P. Tæda*, resembles the French, has the sp. gr. ·864, boils at 156°–157° C., and is dextrogyre. American turpentine yields about 17 per cent. of oil.

Besides these four principal varieties, the following are likewise met with:—

Pine Cone Oil (*Oleum Abietis pini*) is obtained by distilling with water the cones of *Abies pectinata*. It has a much finer odour than oil of turpentine; sp. gr. ·868; boiling point, 160°–162° C.; dextrogyre.

Dwarf Pine Oil (Krummholz, or Latschin oil), *Oleum pini pumilionis*, is obtained by distilling the young tops and cones of *Pinus pumilio* with water. It has a peculiar odour, reminding of juniper sp. gr. ·865; boiling point, 170° C., and is lævogyre.

Pine Leaf Oil is obtained on distilling the leaves of *Pinus sylvestris* or *P. abies* by means of steam. It has a very fine aromatic odour; sp. gr. ·876; boiling point, 160° C., and is dextrogyre.

Templin Oil (also Kienöl, German) is obtained chiefly in some sections of Switzerland and Tyrol by distilling the wood, branches, leaves, cones, etc., with water. It has a lemon-like odour; sp. gr. ·86–·88; boiling point, 160°–164° C., and is lævogyre.

Adulterations of Oil of Turpentine. Dr. J. Morrel. (*Pharm. Journ.*, 3rd series, viii., 726.) Notwithstanding the comparatively low price of turpentine oil, it is the subject of numerous sophistications, of which the following are the best known:—

1. *Fixed Oils.*—These, if present, may be easily detected by placing a drop of the suspected turpentine oil on paper and heating moderately. If the sample be pure the spot disappears completely, but if it be mixed with a fixed oil a greasy stain remains. Further, oil of turpentine dissolves completely in 90° alcohol, whilst fixed oils only yield a small portion (the fat acids) to that solvent.

2. *Water.*—Leuchs points out that the clear appearance of essential oils is no proof of their absolute freedom from water. Small quantities of water may, however, be detected by shaking the oil with two or three volumes of petroleum, when the mixture becomes turbid owing to the separation of the water.

3. *Swedish Oil of Turpentine*, a name applied to a product of the distillation of wood. This adulteration is practised in Sweden, and the turpentine oil then has a disagreable smell. Sandström has found that its presence can be clearly distinguished by pouring the oil carefully into a test tube containing commercial nitric acid, so as to float on the top of the acid. If Swedish turpentine oil be present, it is immediately coloured brownish, even when mixed with four times its volume of pure oil. Genuine turpentine, whatever its origin, is not coloured at once, and only acquires a yellowish tint after some time. If Swedish turpentine oil be shaken with twice its volume of commercial nitric acid, a brownish colour is quickly produced that becomes darker and finally black in proportion as the mixture is thoroughly effected. Pure turpentine oil, treated in the same manner, is at first only coloured by the acid yellow, becoming at the end of two hours yellowish red. In this experiment the turpentine oil does not mix thoroughly with the acid, a portion, having a pale yellow colour, floating on the top. If the Swedish turpentine oil is not completely colourless, it does not mix intimately with the acid, and the formation of a brownish black resinous layer can then be observed.

4. *Oil of Pine* (German, Kienöl).—To detect this sophistication Lintmans recommends to take 2 grams of the suspected oil, add to it 4 grams of ammonia, sp. gr. 0·96, filter, and treat the filtrate with

a few drops of a 10 per cent. solution of potassium nitrate; then add carefully 10 drops of nitric acid, sp. gr. 1·3, so that it descends to the bottom of the aqueous layer. If oil of pine be present, a yellow or yellowish brown colour is produced. A mixture of 1 part of oil of pine with 19 parts of turpentine oil gives a perceptible colour.

The Uses of some of the Indian Species of Bassia. J. R. Jackson. (*Pharm. Journ.*, 3rd series, viii., 646.) The characteristic properties of the Sapotaccæ are, as is well known, of an oleaginous nature, and this principle is perhaps more fully represented in the genus *Bassia* than in any other. The best known species is the shea butter-tree, which, though described by Don as *Bassia Parkii*, has by modern botanists been put in the genus *Butyrospermum*. It is an African tree, and is well known on account of the accurate description which is recorded of it in Mungo Park's travels; the concrete oil he describes as being, when fresh, equal to good butter from cows' milk. The fat is extracted from the seeds by boiling. When fresh it is of a white colour, and of a bland agreeable taste; with age, however, it turns yellowish and becomes somewhat rancid. It is much used by the people in the countries where the plant grows, and is an article of trade at Sierra Leone.

Three species of bassia are well known in India:—*Bassia butyracea*, Roxb., *B. longifolia*, Willd., and *B. latifolia*, Roxb. The first is known as the Indian butter-tree, or "phulwa," and grows to a height of from forty to fifty feet, with a straight trunk five or six feet in circumference. A soft but solid white fat, about the consistence of fine lard, is extracted from the seeds by a system of bruising and pressing somewhat in the following manner:—After being beaten till they are about the thickness of cream, the mass is put into a cloth bag, upon which a heavy weight is placed, and left to stand till all the oil or fat is expressed. This fat or butter has the reputation of being a valuable preservative for the hair, and when mixed with sweet scented oils is thus used by the native population, and is also exported. Scented or perfumed with attar of rose or cloves, it forms an ointment which has a great reputation in rheumatic and similar affections. The fat may be kept for a very long time without deteriorating, and when pure it is said to burn well with a bright light, without smoke or smell. It also makes excellent soap. The cake left after the expression of the oil is eaten as food. The pulp of the fruit has a sweet, insipid taste, but is nevertheless eaten by the people. A sweetish juice is sometimes extracted from the flowers and made into sugar, and sold in the

bazaars, and is described as being very similar in all respects to date-sugar. The flowers, unlike those of other species, are not eaten.

Bassia longifolia, Willd., known as the "illupi," is a tree growing to a height of some forty feet, and common in the forests of western Mysore, Malabar, and the Circars. The seeds yield an oil in plenty, but of a quality inferior to that from the other species. It retains its solidity at a moderate temperature, but it is said to keep good in the warm season only for a fortnight or three weeks, when it becomes so rancid as to give off a very disagreeable smell. In cold weather, however, and if it is well secured from contact with the air, it will keep good for months. The oilcake or residue left after the expression of the oil, is used for preparing a head wash. From the bark a viscid gummy juice exudes, which was formerly used in rheumatic affections; and from the leaves was also obtained a similar juice. From the bark is prepared a decoction which is used as an astringent and emollient. The flowers themselves are roasted and eaten, and are also bruised and boiled till they form a jelly.

Bassia latifolia, Roxb., is perhaps the most important of the Indian species, not so much on account of the oil which it yields, as for the flowers. The tree is commonly known as the "mahwa," and grows to a height of sixty feet, the trunk often measuring six to seven feet in circumference. Dr. Brandis, in his "Forest Flora," describes it as being cultivated, propagating itself by self-sown seedlings, and protected in most parts of India. In the Punjab it is grown in the sub-Himalayan tract and the outer valleys as far as the Ravi, but not commonly in the plains. It is abundant in all parts of Central India, from Guzerat to Behar. There seems no doubt that the tree is indigenous in the forests of the Satpura range of Western India above Ghat, and perhaps also in eastern Kumaon. It thrives in dry, stony ground. The old leaves are shed gradually from February to April, the fresh leaves opening out immediately afterwards. The flowers generally appear before the new leaves, in March and April, and after the corollas have dropped, the leaf buds above the flowers expand. The fruit is eaten both in the ripe and unripe states. The seeds contain a quantity of oil, which is obtained from them by expression. It is at first quite fluid, and of a greenish colour; but while it keeps limpid and sweet for a length of time in a cool climate, in the heat of India it soon turns rancid, assuming a bitterish taste and a brown colour, the heavy oil separating from the fluid portion and sinking to the bottom of the vessel. The cake, after the expression of the oil, is used to poison fish, and it is also used as an emetic. The smoke that arises from the burn-

ing of this oil cake is said to be fatal to rats and various insects. A gum exudes from the bark; and the wood, which is close and even grained, is sometimes used for railway sleepers. It is, however, for the flowers that the tree is most valued. The flowers are very fleshy or succulent, and fall from the trees in vast quantities during the night. They are eaten in very large quantities, both raw and cooked, sometimes with grain and sometimes as sweetmeats. They have a sickly sweetish taste, and a sweet, somewhat spirituous smell, more especially after being enclosed in a box or closed jar. It is remarkable that these flowers, so well known in India, should not before this have been introduced as a commercial article into this country. Experiments, however, have been made with them, quite recently in England, both in distilling and also for cattle feeding; in the former, 6·16 gallons of proof spirit were obtained per cwt., and this spirit was of a very superior quality. For feeding cattle these flowers are also said to be very efficacious, the flesh of pigs and other animals fed upon them is said to be very much improved, and of a delicate flavour.

Adulteration of Valerian Root. Prof. Charbonnier. (From *Journal de Pharm. et de Chim.*) Attention is called by the author to the occasional occurrence of the root of *Asclepias vincetoxicum* in the valerian root of commerce, and to the poisonous nature of this admixture. He has met with samples of valerian containing as much as 30 per cent. of this dangerous adulterant.

Oil of Wild Cherry Kernels. (H. Betz. (*Amer. Pharm. Journ.*, 1878, 112.) This oil is obtained from the kernels of the fruit of *Cerasus serotina*, by hot expression. For several years the kernel of the wild cherry, enclosed in the shell or endocarp, has appeared in quantities in the market, at such a price as to induce manufacturers to express the oil, which may find a use in medicine or the arts. The kernels, together with the shell, are ground to a fine powder, which is carefully dried, and expressed in the cylinder of a hydraulic press, at about 2000 pounds to the square inch. The yield is about 5 per cent.

Although great care is used to avoid all dampness of the powder, the oil has a slight odour of bitter almonds, which, however, is not injurious; the taste is sweetish, agreeable; the colour is dark green and is not extracted by water or alcohol, hot or cold. Sp. gr. 0·906. It becomes solid at 15° F.; the point of ebullition is above the boiling point of mercury; it then takes fire and burns with a yellow flame, leaving a pitch-like residue. Vapours are given off at 208° F., but are not disagreeable until the temperature reaches 600° F.;

it would for that reason be well adapted for an oil bath. The oil is insoluble in alcohol, but freely soluble in ether, chloroform, oil of turpentine, olive oil, and benzin.

As characteristic may be taken its slight bitter almond odour and high boiling point. It can be distinguished from oil of laurel, which has a somewhat similar colour, by alcohol, which takes up the colouring matter of the latter; and from linseed oil by becoming solid at a much higher temperature.

A Spurious Balsam of Tolu. W. A. H. Naylor. (*Pharm. Journ.*, 3rd series, viii., 624.) The author reports upon a spurious balsam of tolu, which had recently been sold by a wholesale firm as a perfectly genuine article. This balsam, when seen in bulk, is yellowish brown in colour; in thin layers it is perfectly transparent and of a golden yellow. It is extremely viscid, in this respect bearing some resemblance to bird-lime, from which, however, it differs, in not possessing the properties of caoutchouc. By keeping it hardens but little, and does not become brittle when exposed for some days to a temperature of 100° C. Its odour is not balsamic, but reminds one rather of glue, and becomes more strongly developed upon warming. Its taste is not perceptible at first, but when chewed a few seconds it produces a sensation of warmth and acridity. A thin layer, examined under the microscope after it had been exposed for three or four hours to a temperature of 90° C., showed no crystalline matter after standing some time. It is completely soluble in carbon bisulphide, benzol, chloroform, and ether; glacial acetic acid and potash solution act as partial solvents. Boiling alcohol of 90 per cent. dissolves it entirely, but the solution deposits upon cooling. The ethereal and alcoholic solutions have a distinctly acid reaction. The balsam melts at 58° C. Strong hydrochloric and nitric acids produce no apparent effect upon it in the cold; strong sulphuric acid develops a cherry-red colour. When treated repeatedly with boiling water, filtered while hot, the filtrate remained clear, had a neutral reaction, and when evaporated left no residue.

Distilled with a mixture of bichromate of potash and sulphuric acid, no oily liquid passed over, and no odour of bitter almonds was evolved. It contains no constituents volatile at a temperature of 160° C. Boiled for some hours with a strong solution of caustic potash it saponifies. If the soap is salted out repeatedly until free from excess of alkali, then decomposed by sulphuric acid, no oil globules can be seen, nor does the separated resin leave a grease spot when applied to bibulous paper. If it is shaken up with weak solution of ammonia, filtered, and the filtrate slightly acidified with

dilute sulphuric acid, a light pink colour quickly develops. If potash is used in place of ammonia, or free dilute acid alone, the colour is not produced. In this particular it corresponds with balsam of tolu, but it differs in that no colour is developed in the true balsam, if it is first well washed with hot water. Digested for two days in weak spirit, the clear liquor removed by a pipette, the insoluble portion kneaded, then treated with hot alcohol and exposed in a cool place for twenty-four hours; the deposit examined under the microscope, presented no crystalline appearance. These are conditions under which colophony readily assumes the crystalline condition. The absence of organic acids, volatile and fixed oils, together with the difficulty of effecting crystallization, suggested the advisability of attempting a separation of the resins, provided the body was not a simple one. A few preliminary experiments with weak potash solution, spirituous solutions of acetate of lead and copper, sufficed to show the complex character of the resin and to indicate a probable method of fractionation. That acid and indifferent resins were both present was ascertained by kneading with a glass rod a portion of balsam with weak ammonia solutions, adding repeated solutions of chloride of sodium, and filtering; the filtrate, when acidified with an acid, became turbid through the separation of resin particles, the alcoholic solution of which had a distinctly acid reaction. To effect a separation of the resin, advantage was taken of the solubility of the lead compound of the acid resins in cold alcohol of 90 per cent. From this solution, the mixture of acids was obtained in a free condition by decomposition with sulphuretted hydrogen. The mixture of acid resins thus obtained was precipitated by a spirituous solution of acetate of copper, the copper compound decomposed by sulphuretted hydrogen, filtered, and half the quantity of copper acetate solution necessary for complete precipitation added to the filtrate. It was allowed to stand, filtered, and the remainder of the copper acetate solution added to the filtrate. The respective compounds were decomposed by sulphuretted hydrogen, their solutions evaporated, and the melting points of the corresponding resins ascertained. The indifferent resins were fractionated in a similar manner. Operating in this way until accordant results were obtained, two acid resins were separated, one melting at 55° C.; the melting point of the other could not accurately be determined on account of its want of uniformity. In addition to these an indifferent resin separated, melting at 63° C. None of the fractions separated emitted a terebinthine odour when warmed. The portion of balsam insoluble in cold

alcohol was too small in quantity to admit of further examination.

Every attempt was made to identify this spurious balsam by comparing it with resinous bodies known to be employed in medicine or the arts, but without success. That it is not a commixture of two or more resinous substances, artificially prepared, may be inferred from its uniform behaviour towards solvents, the persistent and unchangeable character of its odour when heated, and the constancy of the melting points of the fractions. That it is not balsam of tolu is certain. The author therefore suggests the probability that this substance is a natural product of new importation, and not a tampered or manufactured article.

Ditain. (From the "Report on the Centennial Exhibition," presented to the American Pharmaceutical Association. *Transactions*, 1877.) The report speaks in high terms of the tonic and febrifugic properties of this substance, the bitter, active (uncrystallizable) principle contained in the bark of *Echites scholaris*, nat. ord., *Apocynaceæ*. Ditain has always been observed to produce the same curative effects as an equal dose of sulphate of quinine, and to be preferable to the latter on account of its leaving none of the disagreeable secondary symptoms—such as deafness, sleeplessness, and feverish excitement —which are the usual concomitants of large quinine doses.

Ditain is given internally in doses of half a dram daily for infants, and double the dose for adults; due allowance being made, of course, for age, sex, temperament, etc., as thought convenient by the respective medical practitioner. For internal administration the standard (Manilla) formula is,—

For Infants.

Ditain	½ dram.
Aq. Flor. Aurant	5 ounces.
Syr. Citri	1 ounce.

One spoonful every hour.

For Adults.

The same mixture, but dissolving one dram of ditain.

Ditain is also used as injections in the rectum. In this form experience has suggested,—

For Infants.

Ditain	1 drams.
Water	1 pound troy.

Dissolve. For three injections; one every three hours.

For Adults.

The same preparation, only instead of one use two drams of ditain.

The same intervals. Very beneficial effects, too, are derived from its use in the form of poultices. Powdered dita bark, corn flour, each half a pound; hot water sufficient to make a paste. Spread on linen, and apply under the armpits, on the wrists and ankles, taking care to renew when nearly dry, and provided the desired effects should not have been obtained.

The extraction and preparation of ditain from the bark is analogous to that of quinine. Maceration with acidulated water and precipitation are its leading features. 100 parts of bark yield about 5 parts of ditain, 0·85 parts of sulphate of lime, and 10 parts of extractive matter; the latter, however, is of no medical virtue whatever. Details respecting the isolation of ditain and other constitutents of dita bark, and the chemical characters of these substances will be found in the *Year-Book of Pharmacy*, 1876, 202–208.

The results arrived at with ditain in the Manilla hospitals and in private practice are stated to be marvellous. An octogenarian mestizo, suffering from typhoid fever, was cured by the application of six grams. A Spanish officer, subject for a long time back to persistent attacks of malarious fever, was treated six times a day with clysmas (injections in the rectum), each of 0·2 gram of ditain; in three days he was well. Its tonic effects are unrivalled. In the above-named practice ditain has completely superseded quinine, and it is now being employed with most satisfactory results in the island of Mindanao, where malignant fevers are prevalent.

Duboisia Myoporoides. E. M. Holmes. (From a paper read at a meeting of the Pharmaceutical Society, March 6th, 1878; *Pharm. Journ.*, 3rd series, viii., 705.) Some specimens of this plant having been presented to the Society's herbarium by Dr. J. Bancroft, of Brisbane, the author supplies the following information, for a part of which he acknowledges himself indebted to that gentleman's paper on duboisia and pituri, read before the Queensland Philosophical Society at Brisbane. The particulars supplied show that there exists a plant in tolerable abundance from which an active principle possessing the same properties as atropine may probably be obtained more economically than from belladonna.

The duboisia is a small tree or tall shrub, about twenty feet in height, with long, slender, erect branches, arising from the stem at an acute angle; the leaves generally covering only the tops of the

branches, so that except at the summit the woody portion of the tree is rather bare.

The leaves are alternate, shortly stalked, quite smooth and entire, lanceolate in shape, from three to four inches long, and about one inch broad in the middle. The flowers, which are pale lilac or white, and very small, are arranged in terminal panicled cymes. The corolla is regular, bell-shaped, erect, and only two lines long. The stamens are didynamous, with the rudiments of a fifth one, and the fruit is small, succulent, and berry-like. From the above description it will be seen that the plant appears to be nearly allied to the *Scrophulariaceæ*, on account of its didynamous stamens; while on the regular corolla it approaches the *Solanaceæ*. Accordingly botanists have been somewhat puzzled as to which family it naturally belongs. Together with *Anthocercis*, *Petunia*, and several other genera forming the natural group *Salpiglossidæ*, it was, by several botanists, formerly placed in the *Scrophulariaceæ*, but has now found a resting-place among the *Solanaceæ*. This view of its natural position receives confirmation from the fact that the properties of several of the plants of the group, such as *Anthocercis viscosa* and *Duboisia myoporoides*, have recently been found to possess properties similar to those of belladonna. The reniform seeds, with a wrinkled and pitted testa, also resemble those of many of the *Solanaceæ*. Of the genus, *Duboisia*, the plant now under consideration is the only one known with certainty, although Baron von Mueller considers that two other plants, which he has provisionally named *D. Hopwoodii* and *D. Leichardtio*, should be placed in the same genus. Until the fruit of these plants is discovered, it is not certain whether they should be referred to *Anthocercis* or *Duboisia*, the former genus having capsular and the latter a baccate fruit.

Duboisia myoporoides is a native of Australia, occurring in various localities, from near Sydney to near Cape York. It has been found also in New Caledonia, and more recently by Baron von Mueller in New Guinea also. About Brisbane it grows plentifully on the borders of vine scrubs, and springs up after the forest of timber has been burnt off.

The history of the discovery of the properties of duboisia is somewhat interesting. Dr. J. Bancroft had been investigating the botanical source of pituri, and sent some leaves to Baron Mueller, who identified them with his *Duboisia Hopwoodii*, and suggested that Dr. Bancroft should try the properties of *Duboisia myoporoides*, stating that in his opinion the leaves of that plant would be found to possess properties similar to those of stramonium. Dr. Bancroft

followed out the suggestion, and tried an extract of the leaves upon some of his domestic animals. He found that the pupil of the eye became widely dilated, and that cats and dogs when under its influence walked about as if blind and helpless, falling over the least irregularity of surface; but that if let alone they would go to sleep. He then tried it on human beings in ophthalmic cases, and found its action both powerful and rapid in dilating the pupil of the eye. The extract appears almost equal to atropine in strength, and is now used instead of that alkaloid both at Brisbane and Sydney. The aqueous extract is the preparation which has hitherto been used, the active principle not having been isolated. There is, however, every probability that it will be found to be an alkaloid similar to, if not identical with, atropine. The properties of the extract have lately been examined by Dr. Ringer and Mr. Tweedy, and an account of their experiments appeared in the *Lancet* for March 2nd.

Dr. Ringer finds that besides dilating the pupil of the eye, it dries the mouth, arrests the secretions of the skin, and produces headache and drowsiness; it also increases the action of the pulse, antagonises the action of muscarine, and after some days excites tetanus in frogs. Mr. Tweedy arrives at the conclusion, that if there be any difference between them, the extract of duboisia is more prompt and energetic than atropine, and certainly very much more so than the strongest extract of belladonna. When diluted with twenty parts of distilled water, the solution does not cause smarting and but little watering of the eyes, while the pupils become more rapidly and completely dilated than when the undiluted extract is used. In every case in which the duboisia has been used by Mr. Tweedy, its action has been beneficial, and he is tempted to believe superior to that of atropine. As an external application, duboisia might also prove a valuable remedy.

The Alkaloid and Active Principle of Duboisia Myoporoides. A. W. Gerrard. (Abstracted from a paper read at the Pharmaceutical Society's Meeting, April 3, 1878, and reported in the *Pharm. Journ.*, 3rd series, viii., 787.) The author succeeded in isolating an alkaloid and active principle from an aqueous extract of duboisia by the following process:—One thousand grains of the extract were thinned by the addition of an equal volume of water and treated with alcohol till no further precipitation occurred; the alcoholic solution was filtered, the insoluble matter washed with alcohol, the alcohol then distilled off, and the residual extract after being diluted with a small portion of water treated with ammonia in slight excess and shaken with chloroform; the latter when separated and distilled yielded a varnish-like residue having a

powerful alkaline reaction. By re-solution in dilute sulphuric acid, and addition of ammonia, a dull grey precipitate was produced, immediately aggregating into oil-like drops heavier than the mother-liquor. The alkaloid was finally extracted with ether, which yielded 21 grains of it after evaporation. It appeared as a yellow viscous mass, freely soluble in alcohol, chloroform, ether, benzol, and carbon bisulphide; fairly soluble in water, and imparting to it a decided alkaline reaction. Solutions of the alkaloid in the preceding solvents left no crystals upon spontaneous evaporation. A portion of the new alkaloid, converted into sulphate and treated with various reagents, was found to give reactions so similar to atropine that the author determined to test it side by side with that alkaloid, the better to observe their relations and differences. The results of his experiments strongly point to the non-identity of the two bases, for the following reasons:—

1. The solubility of the duboisia alkaloid is much greater than that of atropine.

2. Its power of neutralizing acids is greater than that of atropines

3. Its behaviour to sulphuric acid in the cold, and also when heated with bichromate of potash, differs from the behaviour of atropine under the same conditions.

4. When boiled with baryta the odour it evolves is entirely different to that given off by atropine under the same treatment.

Drs. Sidney Ringer and W. Murrell have investigated the physiological properties of the new alkaloid, and have found them to agree closely with those of atropine.

Action on the Eye.—It quickly and widely dilates the pupil. A small quantity of a solution (1 in 120) was dropped into an eye, and in ten minutes the pupil was widely dilated.

Action on the Skin.—One-sixtieth of a grain was injected under the skin of a patient troubled with night-sweating. The sweating was much prevented.

Effect on the Mouth.—One-sixtieth of a grain hypodermically applied to two patients caused great dryness of the mouth.

Antagonism to Muscarine.—Like atropine it antagonises the action of muscaria on the heart of a frog. The heart of a brainless frog being exposed, a minute quantity of extract of aminita muscaria was applied. The heart-beats had nearly stopped in five minutes, there occurring only an occasional pulsation. On the application of a small quantity of solution of the duboisia alkaloid (1 in 20) the heart in half a minute beat strong and naturally, at the rate of thirty-four per minute.

Tetanizing Property.—Like atropine, this alkaloid produces tetanus after the lapse of some hours. One-seventh of a grain, one-fifth of a grain, and again one-seventh of a grain respectively were injected under the skins of three frogs. Slight but distinct tetanus occurred with two in twenty-four hours.

Sophora Speciosa. C. Bullock. (*Chemist and Druggist*, March, 1878.) At a meeting of the American Pharmaceutical Society the author described the seeds of this plant. A quantity had been sent him from San Antonio, Texas. They are somewhat irregular in shape, with a general disposition to an oval form, the large ones having a longitudinal diameter of $\frac{60}{100}$ths of an inch, and a transverse diameter of $\frac{45}{100}$ths; their colour varies from pale to dark red; the testa is horny, from $\frac{3}{100}$ths to $\frac{5}{100}$ths of an inch in thickness; the interior is a white oily kernel, having a slightly bitter taste. The seed yields its colouring matter to dilute, but not to strong alcohol; it has not yet been determined in what part the medicinal activity of the bean resides, but the probability is that it is in the testa. The seeds are contained in the pod of yellowish brown colour, varying from 1 to $2\frac{3}{4}$ inches in length, and enclosing from one to five seeds. Professor Wood, junr., has observed in them an apparently new alkaloid, for which he proposes the name of *sophoria*. Half of one of the seeds is said to be sufficient to produce delicious exhilaration, followed by a sleep lasting one or two days. It is said that a whole seed will kill a man.

Plerocaulon Pycnostachyum, Ell. J. M. Maisch. (*Amer. Journ. Pharm.*, 1878, 53.) An imperfect specimen of the subterraneous portion of this plant was received from Georgia, where it is known as *blackroot*, and enjoys some local reputation as a valuable alterative. The plant belongs to the nat. ord. *Compositæ*, has a nearly simple stem, with decurrent, lanceolate, wavy-margined leaves, which are smooth above and densely tomentose beneath. The inflorescence is spicate, the imbricated involucral scales are deciduous, the ray florets are white, and the akenes are crowded with long hairy pappus. The plant grows on the damp pine barrens of the Southern States, from North Carolina to Florida.

The portion used is the rhizome, which is horizontal or oblique in the ground, and when viewed from above has a compact but knotty and somewhat contorted appearance. Its most striking peculiarity is, that on the lower side it divides into a number of closely-set tuberous branches, which are nearly perpendicular and somewhat conical, grow to the length of about an inch, and are then suddenly contracted, each into one thin, wiry rootlet of about one or two

inches. The rhizome has a thin bark, which is externally of a black colour, internally of a greyish brown, and adheres but loosely to the rough wood, which is greyish or blackish brown, and divided into numerous very narrow wedges, loosely connected by the shrunken, narrow, medullary rays from which the tangential surface, after the removal of the bark, assumes a lace-like appearance. The rootlets have a similar character, only the bark is relatively thicker. The recent rhizome branches, from which overground stems had grown, are scarcely one quarter of an inch in diameter, but on their lower surface show already the disposition of sending off the perpendicular, cylindric-conical branches described, and as the latter increase in size the stem bases become almost obsolete, and are reduced to mere scars, more or less concave. The entire rhizome is inodorous and the wood tasteless, while the bark has a slightly acrid and peculiar bitterish taste.

Blackroot resembles in colour the rhizomes of *Cimicifuga racemosa* and *Leptandra virginica*, both of which are easily distinguished from it by the total absence of the perpendicular tuberous branches, and more particularly the former, by its stout ascending rhizome branches and the cross-shaped disposition of the meditullium of its rootlets, and the latter by the horizontal branches of the rhizome, its hard wood, and rather large pentagonal or hexagonal central pith.

In regard to its medicinal properties, Dr. F. P. Porcher ("Resources of the Southern Fields and Forests," 460) says that much use is made of it as an alterative, and that it is supposed to be possessed of decided value; also, that it is well known as the blackroot of the negroes, and is given in the form of a decoction (how strong?) several times a day. Nothing is known of its chemical constituents.

The Useful Species of Viburnum. J. M. Maisch. (*Ibid.*, 1878, 50.)

Viburnum obovatum, Walt.—This species is mentioned in Gray's "Manual," and in Chapman's "Flora of the Southern United States," the latter of which describes it as a shrub or small tree, while the former states it to be a shrub from 2 to 8 feet high. It occurs on river banks from Virginia to Florida westward. The branches are opposite, and covered with a thin brown or reddish grey bark, which adheres firmly to the white wood; in the youngest branches the bark is more green, but soon becomes covered with minute brownish, corky warts, which, on becoming confluent, give the older bark a somewhat irregular striate appearance. A distinct ridge runs from the base of each petiole downward to the next internode, and may be observed, also, on somewhat older branches,

but gradually becomes indistinct through the development of the surrounding corky tissue. The leaves are small, about $\frac{1}{2}$ to 1 inch long, opposite, thick, varying in shape from broadly obovate to spatulate, obtuse at the apex, wedge-shaped at the base towards the short petiole, and on the somewhat revolute margin either entire or slightly crenate or denticulate, chiefly towards the apex. Both surfaces are smooth, the upper one being dark green and glossy, the lower one more greyish green, and marked with numerous minute brownish dots. The inflorescence consists of small sessile three-rayed cymes, with white perfect flowers, which produce small ovoid-oblong black and one-seeded drupes. The wood is tasteless, the bark has quite a distinct bitter taste; but the bitterness of the leaves is by far more persistent. As far as may be judged from the taste, the leaves would appear mainly to possess whatever medicinal virtue may reside in the plant; how effectual they may be as an antiperiodic is not known.

Viburnum prunifolium, Lin.—Dr. Phares, of Newtonia, Miss., in 1867 called attention to the properties of the bark of this species, ascribing to it nervine, antispasmodic, tonic, astringent, and diuretic properties, and recommending it as particularly useful in preventing abortion and miscarriage. The species is a tall shrub or small tree, from 10 to 20 feet high, growing in thickets, and is readily recognised by its oval or obovate, sharply serrulate leaves, which are opposite, glossy above, about 2 inches long, and raised upon short, slightly margined petioles. It occurs in the United States from Connecticut south to Florida and west to Mississippi, and is generally known as *black haw*, the fruit being a small edible blue-black drupe, containing a flat and smooth putamen. The leaves, like those of the allied *V. nudum*, Lin., and its variety *cassinoides*, have occasionally been used as a substitute for tea.

Viburnum opulus, Lin.—This species is quite extensively distributed. It is indigenous to Canada, and found in the northern United States, and southward along the Alleghanies to Maryland; likewise throughout a great portion of Europe and of the northern section of Asia. In favourable localities it attains a height of from 12 to 15 feet, but is more generally a lower shrub, with a grey or greyish brown bark; broad, three-lobed, toothed or crenate leaves; and globular, acidulous, bright red drupes, having a flat, smooth putamen. From the resemblance of the fruit to the cranberry, this species is known on the Continent as *high cranberry* or *cranberry tree*. The shrub preferring moist locations, and the inflorescence resembling that of the elder, its popular German name is *Wasser-*

holder, or *water elder*, *Sambucus aquaticus*, under which name it was formerly officinal. A variety produced by cultivation has all the flowers sterile and the cymes more or less globular and showy; it is known by the names of *snowball* and *Guelder-rose*. The indigenous species was described by Pursh as *V. oxycoccus* and *V. edule*.

The bark and flowers of the water elder were formerly employed for their supposed alterative and antispasmodic properties, the common name, *cramp bark*, indicating the popular estimation in which it was and is, perhaps, still held in some localities. The fruit has the general properties of acidulous fruits, and where it is frequent is sometimes used in place of the cranberry.

Other North American Species of Viburnum.—Chapman enumerates nine species as being indigenous to the Southern United States east of the Mississippi; of this number only one, *V. scabrellum*, Tor. and Gr., is peculiar to that section, while the remaining eight are likewise found in the Northern States, some extending into Canada; three additional species are found in the northern section, making twelve indigenous to the United States. Aside from *V. prunifolium*, referred to before, the following are met with from the New England States southward to Florida, the last two (perhaps all three) being likewise indigenous to Canada; they are, *V. nudum*, Lin., or *white rod; V. dentatum*, Lin., known as *arrow-wood;* and *V. acerifolium*, Lin., or *dockmackie*. Their leaves have a bitter taste, while the bark is bitter and astringent. The author thinks that they are not medicinally employed in any part of North America.

Exotic Species.—De Candolle's "Prodromus" enumerates altogether forty-seven species, besides four doubtful ones from Japan, which are insufficiently known. Deducting those which are at present regarded as mere varieties of other species, the number is reduced to about forty species, twenty-eight of which are exotic, and distributed over Europe, the Canary Islands, Africa, Asia, the East Indian Islands, the West Indies, and South America. Only a few of these appear to be put to some use.

Viburnum Dahuricum, Pall., produces a sweet fruit, which is eaten in its native country, the eastern section of Siberia.

Viburnum Tinus, Lin., is known as *laurestine*, or *bastard laurel*, the *laurier-thym* of Southern France, on account of its evergreen, glossy leaves, which are entire and slightly revolute at the margin, and hairy on the nerves beneath. It is occasionally met with in cultivation, and produces black-blue drupes, which are said to possess cathartic properties, and are, in some localities of the Mediterranean basin, employed as a remedy in dropsy.

Viburnum odoratissimum, Ker., from China, is likewise occasionally met with as an ornamental shrub; it is evergreen, and has the leaves somewhat toothed, and dense cymes of white, very fragrant flowers.

Viburnum lantana, Lin., occurs in the thickets of Central and Southern Europe, and is known as *litby tree* and *giddy berry* (Schwindelbeere). The grey-brown, smooth, or, when young, mealy pubescent bark has an acrid taste, and produces blisters when applied to the skin in the fresh state. The leaves are oval or ovate, sharply serrate, and mealy pubescent on the lower surface, have an astringent taste, and were formerly used in diarrhœa and similar complaints. The fruit when fully ripe is black, mucilaginous, sweet, and astringent, and was employed in various inflammatory diseases. The branches have been used for making pipe stems.

Chemical Investigations.—The author believes that the above-named species comprise all which have been, more or less, employed in medicine, and of those only two have been subjected to chemical investigations.

During his patient and elaborate researches on the constitution of fats, Chevreul observed in the berries of *Viburnum opulus* a volatile acid, which he recognised as identical with the phocenic acid discovered by him in the fat of the dolphin. Afterwards Dumas proved phocenic acid to be identical with valerianic acid. H. Krämer (1834) examined the volatile acid obtained from the bark of the same shrub, compared this *viburnic* with valerianic acid, and found it to differ from the latter in odour and in the characters of several salts; however, the analytical results obtained by L. von Monro (1845) appear to establish the identity of the two.

Valerianic, besides acetic and tartaric acids, was found by Enz (1863) also in the berries of *Viburnum lantana*, which contain likewise a tannin colouring iron salts green. Krämer found in the bark examined by him malic acid and tannin, giving a blue reaction with iron salts.

The bitter principle called *viburnin* was isolated by Krämer from the ethereal extract of the bark by treating it with hot water, removing the tannin from the solution by means of hide (parchment), and decolorizing afterwards with animal charcoal; the colourless liquid left on evaporation a light yellowish mass, which yielded a nearly white powder, of neutral reaction and purely bitter taste; it was slightly soluble in water, more freely in alcohol, and on incineration left a little ash.

Enz found in the fruit of the species mentioned an acrid and a

neutral bitter principle, the latter being yellow, hygroscopic, readily soluble in water, and uncrystallizable, even after dialysing it; the fruit was boiled with lime and water, the filtrate neutralized with muriatic acid and treated with animal charcoal; the latter was washed, dried, and exhausted with alcohol, the solution evaporated to a syrupy consistence, deprived of the acrid principle by ether, and then evaporated.

Leo's experiments (1834) for determining the nature of the colouring matter of the fruit of *V. opulus*, did not yield any important results.

The remaining constituents were those very generally distributed throughout the vegetable kingdom, such as pectin, resin, fat, gum, etc. It would be of interest to ascertain the nature of the bitter principles contained in the two first-named species, both of which are indigenous to North America, and called *black haw*.

Note on Rheum Officinale grown in England. H. Senier. (*Pharm. Journ.*, 3rd series, viii., 444.) Since, by the more rapid growth of *Rheum officinale*, the yield is much larger than *Rheum rhaponticum* as grown in this country, it becomes a matter of interest to know whether it can replace this latter species commercially, and also how it varies in medicinal properties from the East Indian root, supposed to be derived from the same species. In order to attain these objects, the author compared the powdered roots, and also infusions and extracts prepared from them.

The *powders*, when prepared quite dry and passed through sieves of the same fineness, show a marked difference in colour: the English *Rheum officinale* being the brightest, the East Indian coming next, and lastly *Rheum rhaponticum*.

The *infusions*, when prepared according to the British Pharmacopœia, vary but little in colour: that from the English *officinale* being a little darker than the other two.

The amount of *extract* obtained by rectified spirit was: East Indian, 38 per cent.; *rhaponticum*, 21 per cent.; English, 17 per cent.

The *ash* amounted to: East Indian, 12·72 per cent.; *rhaponticum*, 7·9 per cent.; English, 4·66 per cent.

These results point to the conclusion that the root of *Rheum officinale*, at least that grown in England, is of less commercial value than that of *Rheum rhaponticum*.

The Poisonous Properties of Yew Leaves. Prof. Redwood. (*Ibid.*, 361.) A case of poisoning by an infusion of yew leaves having occurred in the neighbourhood of London, Prof. Redwood

was called upon as an expert. Having established the absence of mineral and the more obvious organic poisons, but finding yew leaves partly digested in the intestines, he made some experiments on the effects of yew leaves on animals, to arrive at a positive knowledge of their effects. A rabbit, to which about 50 grains of the fresh leaves had been given, died without a struggle in five hours. In the discussion on the author's paper, it was suggested that taxine, the active principle of yew, would probably prove to be a resinous substance, like scammonin or jalopin, instead of an alkaloid, as it is now regarded to be.

The Adulteration of Expressed Oil of Almonds. J. D. Bieber. (*Pharmaceut. Zeitung; New Remedies*, Nov., 1877, 324.) The author has ascertained that the larger portion of the commercial expressed oil of almonds (oil of sweet almonds) is either adulterated or entirely fictitious. In the most favourable cases peach-kernel oil is substituted in its place. The admissibility of the oil obtained from peach and apricot kernels might possibly be defended on the ground that the latter are nearly alike in chemical composition [?] and in price to the small Barbary almonds. The author has succeeded in finding a reliable reagent to distinguish the pure almond oil from sophistications. His results are based on experiments made with the oil of sweet as well as bitter almonds of all commercial varieties, and on those made with other oils. It was first ascertained that the age of the almond oil, or its manner of preparation (by cold or hot pressing) was of no influence upon its chemical behaviour towards the reagent. This latter is prepared by mixing equal weights of pure concentrated sulphuric acid, red fuming nitric acid and water, and allowing the mixture to cool. Mixtures made with five parts of oil and one part of the acid show the following characteristics:—

Peach-kernel oil: assumes at once the colour of peach-blossoms, turning afterwards dark orange.

Sesame oil: first pale yellowish red; afterwards dirty orange-red.

Poppy oil and walnut oil: a somewhat whiter liniment than pure almond oil.

Mixed with pure nitric acid of 1·40 specific gravity, the behaviour is as follows:—

Almond oil: pale yellowish liniment.

Peach-kernel oil: at once a red liniment.

Sesame oil: dirty greenish yellow; afterwards reddish.

Poppy oil and walnut oil: an entirely white liniment. With the first-mentioned reagent (mixture of acids and water), an addition

of five per cent. of peach or sesame oil may be readily recognised. By making a series of mixtures of almond and peach oil, differing by ten per cent. among themselves, it is easy to discover, with tolerable accuracy, the proportion of the two oils in an adulterated sample. In order to distinguish whether the foreign oil was sesame or peach oil, the reaction with nitric acid of 1·40 specific gravity is had recourse to. Besides the above-mentioned substitutes, there exist some other oils, chiefly prepared in France and Italy, which greatly resemble almond oil, and might be used as adulterants. One of these is the fatty oil expressed from the seeds of the stone pine (zirbel nuts, pine nuts), which has, however, not been examined by the author.

To the above the editor of *New Remedies* adds:—A very common sophistication, namely, oil of mustard, has not been mentioned by the author; but it is well known that it is often sold for sweet almond oil.

Dioscorea Villosa, Lin. J. M. Maisch. (*Amer. Journ. Pharm.*, 1878, 56.) This is the only representative in the United States of the nat. ord. *Dioscoreaceæ*, and is known by the name of *wild yam*. A number of species of the same genus occur in the East and West Indies, the most important of which are: *Dioscorea alata*, Lin., the white negro yam; *D. triphylla*, Lin., the buck yam; *D. trifida*, Lin., or the Indian yam; *D. Bulbifera*, Lin., the Ceylon white yam; and several others comprised in *D. sativa* of Linnæus. They are generally cultivated in tropical countries for their tubers, which attain a considerable size, weighing frequently from thirty to forty pounds, and, though quite acrid in their fresh state, are cooked and used as food. They contain starch as their valuable constituent, which appears generally to be about 15 to 18 per cent. of the weight to the fresh tuber, but may occasionally reach 24 per cent., according to Sheir (1847), or according to Grouven (1856) fall to 8 per cent.

The rhizome of the indigenous species has a very different appearance. The wild yam occurs throughout the United States from New England to Florida, and westward to the Mississippi, and is quite common in the southern section. It grows in thickets in moist localities, its slender herbaceous stems running over bushes and attaining a length of from 10 to 15 feet and more. The plant is dicœcious; the greenish staminate flowers are in paniculate hanging bunches, the pistillate flowers in simple drooping racemes. The leaves are quite variable, frequently alternate, but sometimes opposite, or even in whorls of four to six; the latter appears to occur oftener in the south. The leaves are broadly ovate, with a heart-

shaped base, entire or wavy at the margin, conspicuously pointed, with from nine to eleven ribs, nearly smooth above and more or less downy, but never villous beneath. The fruit forms a triangular capsule, which is conspicuously winged on the angles, and the pendulous bunches of which are quite striking, and make the plant easy to identify.

The rhizome is horizontal, about one-half of an inch in diameter, somewhat flattened from above, repeatedly forked or branched in various directions, so that the entire rhizome covers a space from six to twelve inches in diameter, the branches bearing a slight resemblance to ginger. Upon the upper surface, at irregular distances, are the circular more or less concave scars, left by the overground stems; beneath and on the sides, at a distance of about half an inch, are the simple wiry rootlets, about two to four inches long. Rhizome and rootlets are of a light or yellowish brown colour, and break with some difficulty, exhibiting a compact white tissue with numerous scattered wood bundles of a yellowish colour. Odour is absent; the taste, at first insipid, soon becomes strongly acrid.

It is regarded to possess antispasmodic, diaphoretic, expectorant, and emetic properties, and has, among other complaints, been recommended in bilious colic in the form of an infusion made with one ounce to the pint, one half being taken at a dose. In Virginia, and probably in other States, it is known among the negroes as *rheumatism-root*, it being considered a sure cure in that complaint. Continued boiling impairs the acrid properties of wild yam, the principle being either volatilized or altered by heat; it has not been investigated. The rhizome contains also a considerable proportion of starch.

The Progress of Cinchona Cultivation and Alkaloid Production in Bengal. C. H. Wood. (From a paper read before the Pharmaceutical Society, Feb. 6, 1878, and reported in the *Pharm. Journ.*, 3rd series, viii., 621.) The author gives a very interesting account of the progress made in the cultivation and utilization of the cinchona species in Bengal, from the time of their first introduction into the country, to a recent period. How great this progress has been may be seen from the fact that it was only in 1861 that Dr. Anderson, the superintendent of the Botanical Gardens, Calcutta, raised the first plants—thirty-one in number—from seeds received from Kew; and that at the present time the total number of cinchona trees growing in Bengal is in round numbers 3,000,000, covering a total area of 1900 acres.

The earliest species of cinchona placed under cultivation at Rungbee were the *Pahudiana*, *officinalis*, *Micrantha*, *succirubra*, and

Calisaya. The bark of the *Pahudiana* was ultimately proved to be comparatively worthless, and the cultivation of this species, therefore, has been long since abandoned. The *officinalis* was well known to furnish one of the most valuable quinine-yielding barks, and its propagation was carried on vigorously for some time, but the results showed that the plant would not thrive under the climatic condition of Sikkim. Experiments were also tried with some plants of *C. pitayensis*, but failed; and attempts at the cultivation of both these species had to be discontinued. The *Micrantha* species and its allies yielded a bark rich only in cinchonine, which is certainly the cheapest and reputedly the least efficacious of the cinchona alkaloids. There was no sufficient inducement, therefore, to extend its cultivation.

Cinchona Calisaya, from its yielding a bark rich in quinine and containing but a small proportion of other alkaloids is undoubtedly the most valuable species for cultivation in Bengal. But it grows under more limited conditions than *succirubra*, is more difficult to propagate, and has therefore not made anything like the same progress. Unlike *succirubra*, it displays a great tendency to furnish a number of varieties, and these do not yield bark of equal value.

The *succirubra* has been deemed a really useful species, and its cultivation in Sikkim has proved a great success. It is hardy, growing well under a sufficiently wide range of conditions; it seeds freely; and from its little disposition to run into varieties it can be easily propagated. Thus the extension of *succirubra* in Sikkim has gone on with great rapidity.

The total number of *succirubra* trees growing is estimated in round numbers at 2,500,000. In the progress of cultivation a certain amount of bark was annually obtained from these by the necessary processes of pruning and thinning; and in 1875–76, in addition to that got by such means, a crop of bark was taken by cutting down and stripping a large number of trees. The following table shows the total amount of dry *succirubra* bark yielded by these plantations up to the end of March, 1876:—

	lbs.
Collected by pruning and thinning during 1869–70 .	2,400
,, ,, ,, ,, 1870–71 .	12,500
,, ,, ,, ,, 1871–72 .	39,000
,, ,, ,, ,, 1872–73 .	*nil.*
,, ,, ,, ,, 1873–74 .	16,000
,, ,, ,, ,, 1874–75 .	39,405
Crop of 1875–76	211,931
Total . .	321,236

All the facts collected show that the lantations are now capable of annually yielding 360,000 lbs. of dry *succirubra* bark, containing an average of 4 to 5 per cent. of total alkaloid, the average composition of which may be represented as follows :—

Quinine	16·31
Cinchonidine	30·53
Cinchonine	35·26
Amorphous Alkaloid	17·90
	100·00

Samples of bark taken from the lower part of the stems of the finest trees of different ages have yielded the following per centages of total alkaloids :—

No. 1.	Trees planted in		1866,	total	Alkaloid,	6·7	per cent.
,, 2	,,	,,	1867	,,	,,	7·3	,,
,, 3	,,	,,	1868	,,	,,	6·8	,,
,, 4	,,	,,	1869	,,	,,	6·6	,,
,, 5	,,	,,	1870	,,	,,	6·6	,,
,, 6	,,	,,	1871	,,	,,	6·0	,,
,, 7	,,	,,	1872	,,	,,	7·7	,,

The total alkaloid from Nos. 1, 6, and 7 of these yielded the following products :—

From 100 parts of Dry Bark :—	No. 1 (1866).	No. 6 (1871).	No. 7 (1872).
Total Alkaloid	6·7	6·04	7·68
Alkaloid Soluble in Ether	2·4	2·73	2·17
Cinchonidine	1·9	1·99	2·95
Cinchonine	2·4	1·31	2·56
Crystallized Sulphate of Quinine	1·3	1·35	0·82

Experiment, however, has shown that the proportion of total alkaloid is greatest in the bark of the root, and diminishes higher up the stem to the branches. The author's observations on these points closely confirm some results recently published by Mr. David Howard (see *Year-Book of Pharmacy*, 1875, 161). It follows from such observations that the entire bark crop cannot be expected to furnish the amounts of alkaloids just given. Numerous analyses of samples taken from bark actually harvested indicate that the average yield of the plantations contains from 4 to 5 per cent. of total alkaloids, as stated above.

Analyses of the bark from six of the leading varieties of *Cinchona Calisaya*, in 1874, gave the following results : —

Cinchona Calisaya Varieties.	1.	2.	3.	4.	5.	6.
Total Alkaloid	1·6	6·1	5·57	7·1	5·7[5]	7·4
Alkaloid Soluble in Ether . .	0·82	5·9	5·21	6·93	5·75	7·4
Crystallized Sulphate of Quinine	None.	4·53	4·6	6·92	5·34	6·2

The best of these varieties would be admirably adapted for the manufacture of a pure sulphate of quinine by a simple process; but some time must elapse, for reasons aforesaid, before this species can be obtained in sufficient quantity for practical utilization on a large scale.

The latter part of the author's paper deals with the manufacture and the medicinal value of the preparation representing the total alkaloids of the Bengal *succirubra* bark, which is now manufactured on a large scale in India, and used with success against the malarious fever so prevalent in that country. This preparation is known as "cinchona febrifuge," and is prepared by exhausting the dry bark with successive portions of dilute hydrochloric acid, and precipitating the resulting liquor with excess of caustic soda. The precipitated alkaloids are collected on filters, washed, dried, and powdered. This product is then dissolved in a quantity of acid just sufficient to take up the alkaloids, filtered from some insoluble colouring matter, and the solution again precipitated. After washing, drying, and grinding, a fine white powder is obtained, which, however, acquires a slight buff tint by keeping. It never agglutinates in any way, even in the trying climate of India. It is freely soluble in weak acids, and is readily taken up by lemon juice, which constitutes a pleasant vehicle for its administration.

For further particulars concerning this preparation, we refer our readers to the original article, and also to a previous notice which will be found in the *Year-Book of Pharmacy*, 1876, 266.

Caladium Seguinum. (*New Remedies*, 1878, 111.) The arum family (*Aroideæ*) contains a plant indigenous to South America, the West Indies, and Southern United States, which is considered by some to be one of the most poisonous members of the vegetable kingdom, although it is sometimes even cultivated in gardens. It is the so-called dumbcane, or *Dieffenbachia seguina*, Schott (*Caladium seguinum*, Vent., *Arum seguinum*, L.). Its stem attains a height of from three to seven and a half feet, the leaves being attached to its upper part in shape of a crest. The latter are oblong-ovate, pointed, and covered with white speckles. The spathe has a pale green colour, and is shorter than the spadix, which bears flowers exhaling a cadaverous odour.

The juice of the fresh plant is exceedingly acrid and caustic, so that even very small quantities of it, carried into the digestive apparatus, produce inflammation and dangerous intoxication. It makes indelible stains upon linen, and might be used as indelible ink, if it were less poisonous. It is said that if cattle accidentally bite the leaves, their tongues swell up and their fauces become inflamed. It is therefore necessary to use proper caution in crushing the leaves or expressing the juice for pharmaceutical purposes. A single drop sprinkled upon the skin produces an intense itching and burning, and afterwards inflammation. Some persons are more susceptible to its effects than others, and one case is on record in which a drop, spattered on the cheek, although immediately wiped off, produced an erysipelatous inflammation of one side of the face, so as to seriously endanger the life of the individual. The attack was followed by a herpetic eruption. The rhizome seems to contain a more diluted juice, and has been recommended by American physicians as a remedy in pruritus vaginæ, in form of lotion prepared by adding from 15 to 20 drops to a teacupful of water.

It is, however, remarkable that the tincture exhibits the peculiar acridity of the fresh juice only in a faint degree. The reason of this is, that the fresh juice contains small microscopic crystals (raphides), perhaps an oxalate, which pierce the pores of the skin and set up an inflammation. Alcohol does not dissolve these crystals, and only a small proportion of them apparently pass through the filter. Hence it follows that by filtering the tincture through thick paper, or through a multiple filter, these crystals are entirely removed, and with them all trace of acridity. This perhaps explains that some physicians have found it to render good service in pruritus, while others found it inert. It may also be that the original recommendation of its use in this complaint is due to the principle "similia similibus curantur," as the juice is intensely irritating. Scholz, who first used it, administered the tincture in doses of from 2 to 6 drops. This tincture is prepared by macerating 10 parts of the fresh leaves and flowers, previously bruised with the greatest care, with 12 parts of alcohol of 90 per cent., and expressing. The maximum single dose would be about 0·6 grams, or 15 drops, and the highest daily dose about 1·5 grams, or about 40 drops. It may perhaps be best given in the form of the mixture known as—

Mistura Antipruritica, Scholz.

℞ Tinc. Caladii seguini. 0·6–1·5 gram (16 to 40 gtt.)
Aquæ destillatæ . . . 150 gram (5 fl. oz.).
M. A tablespoonful every hour.

Ledum Latifolium, Ait. J. M. Maisch. (*Amer. Journ. Pharm.*, 1878, 54.) About nine months ago specimens from a shrubby plant were received from Michigan, in the northern part of which State the Indians claim for it great healing virtues, it being regarded to possess soporific and cathartic properties, and externally used as a sovereign remedy in fever sores, bruises, and rheumatism. The dry fruit capsules still attached to the plant made it not difficult to recognise it as a member of the *Ericaceæ*, and the above-mentioned species of *Ledum*. Subsequently, the same plant was received from Canada, with the statement that it was popularly used to some extent, and considered a valuable medicine; its supposed properties, however, were not mentioned.

The plant is known by the name of James tea and Labrador tea, and occurs in British North America, and in the United States from New England to Wisconsin, and southwards to the mountains of Pennsylvania. It occurs in cold bogs and damp woods, grows to the height of two to five feet, and has alternate leaves about one inch in length, somewhat aromatic when bruised, elliptical or oblong, with an entire somewhat revolute margin, dark green and shining above, whitish beneath, and covered with a rusty wool. The small white flowers have five or sometimes six stamens, and are in umbels situated at the end of the branches; lateral branchlets with a smooth bark, growing from the base of the umbel. The fruit forms a five-celled capsule, which splits from the base upwards, and contains many minute seeds.

In Redwood's "Supplement to the Pharmacopœia," it is stated that the leaves are used for tea, and when infused in beer render it unusually heady, producing headache, nausea, and even delirium, but have nevertheless been used, it is said, in tertian agues, dysentery, and diarrhœa.

This little shrub is very similar to the *Ledum palustre*, Lin., which is indigenous to northern Asia, eastern and northern and some parts of central Europe, and likewise to British America. It differs from the former mainly by its linear-lanceolate leaves, the ten stamens of its flowers and its more oval capsules. It was formerly known as *Rosmarinus sylvestris*, but the leaves are readily distinguished from rosemary leaves by the dense, rusty, felt-like hairs on the lower surface. The young and fresh leaves have an agreeable aroma and a bitter and astringent taste; the old and dry leaves are less aromatic. They have been employed in intermittent and other fevers, in cutaneous diseases, croup, and other complaints.

Botanical Source of Araroba. Dr. R. A. Monteiro. (*Pharm.*

Journ., 3rd series, viii., 1048.) The tree from which araroba is extracted is known in all places where the industry is carried on under the name "*angelim amargoso*" or "bitter angelim." Why it is called "angelim" is unknown. It is a neighbour of another tree which yields a product having vermifuge properties, the *Andira anthelmintica*, Benth. (*Geoffræa vermifuga*, St. Hil.), from which, however, it differs in appearance, although both belong to the *Leguminosæ*. The term bitter is applied to it because its wood is bitter, like cinchona, and persons who cut down the trees are sensible of a bitter taste which is due to particles which become detached from the inner layers of the wood. There is also an "*angelim doce*" (*Andira vermifuga*, Martuis) and an "*angelim pedra*" (*Andira spectabilis*, Sald.), which also belong to the *Leguminosæ*. The powder obtained from the bitter angelim is invariably called "araroba."

The tree is met with in great abundance in the forests of Camamu, Igrapiuma, Santarem, Taperoa, and Valença in the province of Bahia. It appears to prefer low and humid spots, but it is also met with in the more elevated regions, when these are not very arid. It is erect, smooth, and when it attains its full development it measures 1 to 2 metres in diameter, and 20 to 30 metres from the ground to the small branches. The tree from which the author cut a section at a height of 2 metres from the ground measured 24 metres 20 centimetres up to the first branches. The bitter angelim has no other known use than to furnish araroba; the old trees are preferred because of their greater richness.

The araroba is contained in clefts or cavities, more or less narrow, in the wood. The clefts traverse the wood in the direction of the diameter, and are prolonged through the whole extent of the trunk, becoming narrower towards the upper part. Sometimes small clefts also occur parallel with the primary ones. In order to extract the araroba, it is the practice to hew down the tree, cut it across into small sections, and split these longitudinally, which is favoured by the fibre of the wood and the large clefts, upon the surfaces of which the araroba is deposited.

The araroba is of a yellowish colour comparable to powdered sulphur, though a little darker and devoid of lustre. By the action of the atmosphere it loses little by little its fine colour, so as sometimes to resemble aloes, and at others rhubarb, and finally takes a deep purple colour. The powder is found upon both sides of the clefts and the workmen scrape it off with the sharp edge of an axe. Commercial araroba is, therefore, very impure, as it is always mixed

with a considerable quantity of ligneous particles, which in the green state are easily removed with the araroba. Some that the author himself removed carefully was found to be free from woody particles.

The workmen employed in the extraction of araroba, suffer from irritation of the conjunctiva, which sometimes passes into inflammation of that membrane, and the face will remain swollen and erythematous for some time; but for the irritation caused by araroba to produce these effects it requires that its action shall be prolonged a day or more.

It is quite certain that araroba is not found in the medulla, as has been generally supposed, but is deposited as a concretion in the clefts before mentioned.

Araroba has long been employed in the treatment of ringworm (*Herpes circinatus* and *Herpes tropicus*), but how long is not known. It is also said to be employed in killing fish, by throwing it into lakes and rivers.

The author did not ascertain the exact period of the year when the bitter angelim flowers, but he learned that the flower is dark purple, and the fruit is a pod. The tree is not cultivated.

Examination of the Root of Epilobium Angustifolium. C. J. Biddle. (From *Transactions Amer. Pharm. Assoc.*) The dry contused root, when treated with water, either hot or cold, causes small white crystalline masses to separate, which appear under the microscope to be close bundles of needle-shaped crystals; these were separated mechanically, and on testing, proved to be a calcium salt.

No preparation of the root, when treated with Mayer's test for alkaloids, showed evidence that one existed.

A saturated decoction, treated with the precipitants mentioned in the "U.S. Dispensatory," under Gallæ, page 430, produced very similar results. The root contains large quantities of tannin, gum, and mucilage; it also contains, starch, sugar, resin, gallic acid, extractive, etc.

The tannic acid is the kind which produces a bluish black colour with ferric salts. Its remedial action is not to be attributed to any *one* principle in the root, but to its combined demulcent and astringent properties.

Viscum Album as an Oxytocic. Dr. W. H. Long. (*New Remedies*, 1878, 112.) For ten years the author has successfully used mistletoe as an oxytocic, in the course of which he has arrived at the conclusion that it is superior to ergot. He believes in its superiority for the following reasons:—

1. Because it acts with more certainty and promptness.

2. That instead of producing a continuous or tonic contraction, as ergot does, it stimulates the uterus to contractions that are natural, with regular intervals of rest. Consequently it can be used in any stage of labour, and in primiparœ, where ergot is not admissible.

3. It can always be procured fresh, does not deteriorate by keeping, and is easily prepared.

He has used viscum in many cases of menorrhagia, and hemorrhage from the uterus, with gratifying results, and has taken pains in such cases to give ergot and mistletoe a competitive trial, with the object of testing their relative merits; he unhesitatingly pronounces in favour of the latter. Indeed, cases in which ergot given in powder, decoction, and fluid extract failed to give any relief, the viscum acted promptly.

In post partum hemorrhage the results have been no less satisfactory than in labour and menorrhagia, firm contractions of the uterus being secured in from twenty-five to fifty minutes after administering from one to two does of the mistletoe.

According to the author, the remedy may be administered either as an infusion, tincture, or fluid extract, but he considers the latter the most convenient. The former is made by taking two ounces of the dried or four ounces of the green leaves, pour on these one pint of boiling water, cover closely, and allow to stand until cool enough to drink. Two or four ounces may be given at a dose, and repeated in twenty minutes if necessary. The green leaves impart a disagreeable taste that is lost in the process of drying.

The author has also used an alcoholic tincture, made by taking eight ounces of the dried leaves and saturating them with boiling water, and adding alcohol to make one pint; but this is not as efficient as either the decoction or the fluid extract. It should stand ten days before being ready for use. Viscum makes a nice fluid extract of a dark brown colour, which possesses all the virtues of the parasite.

The best time for gathering the mistletoe is in November, after a few frosts have fallen, and before the sap freezes, though it may be gathered and used at any period of the year. When gathered, it should be at once spread out to dry, as it will mould in a very short time if kept in a box or sack. It is best to dry it in the shade.

Viscum abounds in the western country, and is found in greatest quantities on the walnut and elm trees, though it grows sparingly on a few others, as the red and black locust, oak, etc. So far as he

(the author) is aware the properties of viscum are not affected by the kind of tree on which it grows.

Cinchona Cultivation in Sikkim. (From *The Gardener's Chronicle*, April 20, 1878.) From the annual report to government, it appears that the year 1876–77 has been a very busy and successful one on the cinchona plantation. The crop of the year consisted of 201,455 lbs. of dry red bark, and 6326 lbs of yellow and pale bark, or 207,781 lbs. in all. Special attention continues to be paid to the three modes of harvesting, namely, thinning, uprooting, and coppicing. The total amount of bark obtained by thinning was 57,365 lbs.; by uprooting, 129,711 lbs.; and by coppicing, 12,108 lbs. Thinning is an operation intended rather to benefit the trees left behind than to secure a crop. The respective merits of uprooting and coppicing are yet undecided. Some years must pass before an opinion can be formed (1) as to how young trees will thrive when planted on land cleared by uprootal; and (2) as to the quality and quantity of bark that can be collected from the shoots of coppice stools. The experience of the year has, however, proved that partial coppicing is a failure, as the young shoots are then thin and sickly, and suffer from the shade of the overhanging trees. No further trial will be made of the Nilghiri plan of cropping by the process of renewing the bark under moss. It is found quite unsuited to Sikkim. During the year, 406,600 plants of red bark (*Cinchona succirubra*) were planted out; namely, 237,400 (equal to about 87 acres) on the new or Sittong division, and 169,200 on the old Mungpoo division. The experiment of growing crown bark (*C. officinalis*) has also not been successful; but the new variety (as yet unnamed) promises to do well.

Boa-tam-paijang (Sterculia Scaphigera). J. R. Jackson. (*Pharm. Journ.*, 3rd series, viii., 747.) At page 6, vol. iii., 2nd series, of the *Pharmaceutical Journal* for 1861–62, in the well-known "Notes on Chinese Materia Medica," by the late Daniel Hanbury, is a notice of the "Ta-hai-tsze," or "Boa-tam-paijang," the seeds of which were introduced into France many years since as a remedy for diarrhœa and dysentery. In the notes above referred to they are described as the fruits of *Erioglossum* (?) or *Nephelium* (?); but from specimens contained in the Kew Museum, which were apparently obtained from the first sample brought to Europe, and which have been named *Erioglossum edule*, Bl., they seem upon comparison with authentic herbarium specimens to belong to *Sterculia scaphigera*, Wall. This plant differs in its fruits from most species of *Sterculia*. They are of a thin,

papery texture, and follicular or boat-shaped in form, with veins or nerves running parallel the whole length. As the fruit ripens this follicle bursts, leaving the solitary erect seed which is attached to the base exposed to view. This seed is brown and wrinkled, and is accurately described and figured in Mr. Hanbury's notes. It seems that these seeds have been mistaken for entire fruits, the large papery follicle, which easily becomes detached, not having been present in the samples described. Whether these seeds, which are said to be produced in great abundance, can ever be utilized for any other purpose beside that for which they were first introduced, is a point worth considering. Their extremely mucilaginous or gelatinous nature would seem to indicate some useful application.

Note on Luban Mati and Olibanum. Prof. F. A. Flückiger. (*Pharm. Journ.*, 3rd series, viii., 805.) In the course of the investigations intended for working out the "Pharmacographia," the authors were led to the conviction, as stated there (pp. 121, 131, and 135), that the *elemi* of the mediæval writers agreed with the old gum of the "Ethiopian olive," and that under the latter name not an *Olea*, but *Boswellia Frereana*, Birdwood, is to be understood. Although it is impossible to prove absolutely the correctness of their view, it was the firm belief of Daniel Hanbury that the *luban meyeti* or *mati*, as described in "Pharmacographia" (p. 135), was the drug originally designated elemi. Prof. Flückiger adds that he has no new facts to present in support of that opinion, but he has never met with any statement which would be in contradiction with this suggestion.

The origin and nature of luban mati is now satisfactorily settled; there can be no doubt that it is produced by the yegaar tree, which Dr. Birdwood has described as *Boswellia Frereana;* it appears to be confined to the Somali coast range. Its exudation is entirely different from olibanum by not being constituted of resin, essential oil, and gum, but almost exclusively of the two former. The author has ascertained, on the other hand, that all the various specimens of olibanum which he has received from Captain Hunter, the exquisite whitish tears, as well as the refuse, largely contain gum, and not resin and essential oil alone.

As to the species of *Boswellia*, which afford olibanum, complete authentic and numerous specimens provided with leaves, flowers, fruits, and the exudation of the stems, collected with exact reference to the plants, are highly desirable, for in its botanical aspect the question is still remaining in the same state which was pointed out in the "Pharmacographia." In the beginning of similar investi-

gations, Dr. Birdwood had thought the Arabian frankincense trees to be identical with *Boswellia papyrifera*. Prof. Flückiger was originally of the same opinion, until in 1867, in the "Lehrbuch der Pharmacognosie," p. 31, he stated that this was an error, and accordingly gave the name *Boswellia sacra* to the tree which on the Arabian coast yields olibanum.

Whether this tree is identical or not with that afterwards described by Dr. Birdwood as *Boswellia Carterii*, cannot yet be plainly decided (see "Pharmacographia"). He was, therefore, not quite correct, when in 1869 (or 1871) in "Transactions of the Linnean Society," xxxi., iii., he stated that the author still identified *Boswellia sacra* with *Boswellia papyrifera*. Nor is there the least reason for attributing any commercial kind of olibanum to *Boswellia papyrifera*, although in the recent French translation of the "Pharmacographia," i., 268, this is expressly alleged. Prof. Flückiger knows of no authority in favour of this statement, and has even ascertained that the branches of *Boswellia papyrifera*, as contributed in 1867 from the Upper Nile to the Paris Exhibition, were provided with some tears of a resinous exudation, which, however, were destitute of gum. Richard ("Voyage en Abyssinie," 1839–1843), as well as Th. von Heuglin ("Reise nach Abessinien," Jena, 1868, p. 174) were well aware of the abundant oleo-resin of *Boswellia papyrifera*, but without referring commercial olibanum to it.

Notes on Indian Drugs. W. Dymock. (*Pharm. Journ.*, 3rd series, viii., 23, 101, 161, 383, 483, 521, 564, 745, 1001. From *New Remedies.*)

Polypodium quercifolium, local name, kadic pan or kali pandan. Used as an alterative in malarious fevers.

Prangos pabularia, local, faturasaliyun; vulgar, phuttersalum. The seeds are used as a carminative and abortive.

Aconitum (probably *palmatum*), local, wakma or bikhma. The tuberous roots, resembling those of *A. Napellus*, have a pungent smell like nasturtium, when soaked in water. In doses of two grains, said to stop vomiting and purging, and to allay pain in the abdomen.

Naregamia alata, local, tinpana or kapur bendhi. This is the country ipecac or trifolio of the Portuguese at Goa. The root has a pungent, aromatic odour, and is used as an emetic in doses of 12–18 grains.

Methonia superba, local, vindai or nagkaria. The tubers are an alterative tonic and antiperiodic.

Tribullus terrestris, local, chota gokhrov. The fruit is valued as a diuretic.

Polypodium vulgare, local, basfaij. The dried rhizome is aperient and deobstruent.

Melia superba, local, kala khajur, or kurroo khajur (= black date, bitter date). The fruit has a nauseous, bitter taste, and is a favourite remedy in colic; half a fruit—one dose—is said to remove the pains effectually.

Ocymum pilosum, local, tukm-i-rihan. The seeds are mucilaginous and slightly stimulant.

Plantago Psyllium, local, bartung. The seeds, commonly called barhang, are in great repute as a remedy in dysentery.

Centaurea Behen, local, suffed behman. The root is considered nutritive and aphrodisiac.

Sphæranthus mollis, local, moondi. The tops of the plant have a terebinthinate odour; the whole plant is much used as an alterative and purifier of the blood.

Balsamodendron Opobalsamum, local name of fruit, hab ul balesan. Considered powerfully carminative and digestive.

Peganum Harmala, local, hurmaro and hurmal. The seeds are emmenagogue, and produce a slight intoxication, like *Cannabis indica*.

Sterculia urens, local name, karai, pandrook, kavalee. The gum is called karai gond, forms a thick jelly with water, and is used generally as a substitute for tragacanth.

Hyoscyamus niger, local, khorasanee ajwan. Cultivated for medicinal purposes in the government gardens at Hewra, near Poonah.

Poa cynosurioides, local name in Goa, gramina. The root is used as a substitute for dog-grass by the Portuguese at Goa.

Aplotaxis costus, local, puplate (in Bombay), koot or putchake (elsewhere). The root is extensively used as a perfume, and to protect clothes from moths; also as an aphrodisiac and vermifuge.

Tephrosia purpurea, local, sarpankha. The whole plant, a common weed, is a bitter astringent.

Lodicea Seychellarum, local, daryai, naril. The kernel of the sea-cocoanut is in great repute among the Arabs and Indians as a strengthening medicine.

Abutilon Indicum, local name, petaree; the tubocuty of Goa. The bark of this plant is used in Goa as a diuretic.

Althæa officinalis, local name of flowers, gul khairo; of root, risha-i khitmi; of seeds, tukm-i khitmi. Used as an expectorant.

Malva sylvestris, local, khabazee; the fruit is mucilaginous.

Clerodendron infortunatum, local, kari. The leaves are a cheap and efficient tonic and antiperiodic.

Papaver Rhœas, local, lala. The capsules, not the petals, are in use, but they are probably inert.

Polyporus officinalis, local, gharikoon. Enters into a great many compound remedies of the Mohammedans.

Conium maculatum, local, keerdamana. The fruit probably identical with that of Europe and America. It is generally made into a fluid extract.

Cinnamomum aromaticum (?), local, darchini, is the Chinese *Cassia lignea*.

Sisymbrium Iris, local, khakshir. Small red oblong seeds, regarded to be stimulant, both internally and externally (as poultice).

Cerbera Thevetia, local (?). All parts of the plant abound in a milky juice, and have an acrid smell when bruised. It is identical with *Thevetia neriifolia* of the Indian Pharmacopœia, which is recommended as an antiperiodic.

Pistacia Khinjuk, local, gul-i pista. The galls, which are reddish brown when old, but bright pink on one side, and yellowish white on the other while fresh, are used as an astringent.

Picrorrhiza Kurroa, local name, kutki and kurroo. The rhizome is a valuable tonic in doses of 10–20 grains.

Echium, spec. (?), local, gaozaban; the flowers, gal-i gaozaban. The leaves, generally mixed with pieces of the stem, as well as the flowers, are imported from Persia. They are used in bilious affections as a valuable alterative tonic.

Valeriana Hardwickii (?), local, tugger gauthoda. The roots are used in Bombay mostly as a perfume, but would no doubt form a good substitute for valerian.

Grislea tomentosa, local, dhaitee or dhawnee. The flowers are used by the natives; commercially they are of considerable importance, being used in dyeing and tanning.

Asclepias curassavica, local, kurki. The root, when fresh, exudes a milky juice. [It is a native of the West Indies, where it is known as bastard or wild ipecac, because it acts as an emetic in doses of 20–40 grains. The expressed juice of the leaves is said to be an efficient anthelmintic.—Ed. N. R.]

Aconitum, spec. (?), local, judwar. The history of this drug is beset with many difficulties on account of the vague meaning of the term *judwar*, the name by which it is generally known, and appearing properly to mean "zedoary." Under judwar the author of the "Makhzanual Adwiya" gives antila as the Arabic name, and saturyoos as the Greek. The Indian name, nirbishi, he explains as *nir*

"the antidote to," *bish* "the poison." It appears that the term judwar has at different times been applied to various tuberous roots supposed to have alexipharmic properties, and that in India it is applied to the root of an aconite known from an early date to the Hindoos as nirbishi.

Nelumbium speciosum, local name, kamal. The lotus flowers are used as an external cooling application. The seeds are used as food.

Capparis spinosa, local name of root bark, kabar. Caper bark is recommended in palsy, dropsy, and gouty and rheumatic affections.

Portulaca quadrifida, local, kurfa. The fresh leaves of purslane are used as a cooling astringent application in erysipelas, and an infusion of them is given as a diuretic.

Garcinia Indica, local, kokum. The fruit is largely used all along the western coast as an acid ingredient in curries, and is an article of commerce in the dry state. It is generally prepared by removing the seeds and drying the pulp in the sun; the latter is then slightly salted, and is ready for the market. The seeds are pounded and boiled to extract the oil, which on cooling becomes gradually solid, and is roughly moulded by hand into egg-shaped balls or concavo-convex cakes. This is the substance known as kokum butter; the natives occasionally use it for cooking, but the statement that it is largely used at Goa to adulterate ghee (liquid butter) is incorrect. The apothecaries of Goa prepare a very fine purple syrup from the fruit, which is worthy of attention.

Helicteres Isora, L. = *Isora corylifolia*, Schott et Endl.; the fruit consists of five slender angular carpels twisted like a corkscrew. Its taste is mucilaginous, and its properties may be called demulcent.

Balsamodendron Opobalsamum, Kunth; the balsam and wood. Native names: balasan (Arab., Pers., Bomb.), of balsam; aood-i-balasan (Pers., Bomb.), of wood. Balsam of Mekka, when freshly imported into Bombay, is a greenish turbid fluid of syrupy consistence, having a very grateful odour, something like oil of rosemary. After being kept for some time, it becomes yellowish and more viscid.

Melia Azadirachta, L.; the root, bark, and fruit. The former is officinal in the U. S. Ph. (secondary list). The second has poisonous properties, but is used in leprosy and scrofula. The juice of the leaves, administered internally, is said to be anthelmintic, antilithic, diuretic, and emmenagogue.

Poinciana pulcherrima, L.; the bark, leaves, flowers, etc. All parts are said to be purgative and emmenagogue.

Bauhinia variegata, local name, kachnár (Hind.); kanchan (Bomb. and Beng.). The bark is slightly astringent, and is used to check diarrhœa, and in form of an infusion as a gargle in sore throat, etc.

Zizyphus, spec., local, unnab (Arab.); the dried fruit. This is the jujube of Arabic and Persian works on materia medica, and is not produced in India, but is largely imported in a dry state both from the Persian Gulf and from China. The best comes from Jurjan, China, and Nipal.

Cardiospermum Halicacabum, local, lathapatkari or nayapatki (Beng.); mooda cottan (Tam.); kanpootee (Bomb.). The root and leaves. Root is aperient; leaves are administered internally in rheumatism and in pulmonic complaints.

Sapindus trifoliatus, local, ritha (Hind. and Bomb.); pennan kottai (Tam.). The soap-nut, which has been used in India from the earliest times as a detergent, is considered tonic and alexipharmic.

Semecarpus Anacardium, local, bhela, bhilava (Hind.); biba (Bomb.); shen-kattai (Tam.). The marking-nut is considered stimulant and digestive. It is used in dyspepsia, piles, skin diseases, etc. The acrid juice is a powerful vesicant, and is often used for producing fictitious marks of bruises.

PHARMACY.

PART III.

PHARMACY.

Spirit of Nitrous Ether. C. L. Diehl. (*Amer. Journ. Pharm.*, 1877, 352.) A series of experiments were carried out by the author with the object of answering the following questions:—

I. "Is it possible or necessary to obtain the quantity of distillate required by the United States Pharmacopœia?"

II. "Is the specific gravity of spirit of nitrous ether, U. S. P., correctly stated?"

III. "Is the percentage of nitrous ether in the spirt of nitrous ether of the U. S. P. correctly stated?"

IV. "Is the method of the B. P. for determining the percentage of nitrous ether in the spirit of that standard reliable within pharmaceutical limits, and can it be made available for the product of the U. S. P.?"

To these he returns the following answers:—

To Question I.

1. It is possible to obtain the quantity of distillate required by the United States Pharmacopœia. Whether this is possible without unnecessarily long-continued heating is left undecided by the experiments, but seems probable.

2. It is not necessary to obtain the full quantity of distillate required by the Pharmacopœia. If the reaction takes place at a lower temperature the yield is smaller, but the etherification is complete and the distillate more concentrated than at a higher temperature, at which a correspondingly larger quantity of undecomposed alcohol is carried over with the ether vapour.

To Question II.

1. The specific gravity of spirit of nitrous ether, U. S. P., is not correctly stated.

2. Its specific gravity, if it contains 5 per cent. of pure nitrous ether, should be 0·8235.

3. In the experiments made, the specific gravity varied between 0·822 and 0·825.

To question III.

1. The pharmacopœial statement, that spirit of nitrous ether contains 5 per cent. of its "peculiar ether" is not correct, if by its "peculiar ether," absolute nitrous ether is understood.

2. Conceding that all of the nitric acid used in the process is consumed in forming nitrous ether (and all testimony is in favour of this view), the spirit of nitrous ether of the U. S. P. cannot contain more than 4·1766 per cent. of absolute nitrous ether—$C_4 H_5 O N O_3$.

To Question IV.

1. The method the British Pharmacopœia for determining the strength of its spirit of nitrous ether is correct and reliable, if by the percentage of nitrous ether indicated, such "crude ether" is understood as will separate upon the application of the test.

2. The test is not materially affected by a slight variation in the strength of the saturated solution of chloride of calcium so-called; but if the solution is unduly dilute, the volume of crude ether separated is increased 0·5 per cent. for each 12·5 per cent. of water present in excess.

3. The method of the British Pharmacopœia can be applied to the product of the U. S. P., and will secure uniform results. To this end the distillate is brought to measure not over one-half the expected quantity of spirit (32 fluid ounces is a convenient quantity); this is tested according to the directions of British Pharmacopœia, and is then further diluted with 19 volumes of stronger alcohol for each 1 volume indicated in excess of 5 per cent.

Sweet Spirit of Nitre. F. M. Rimmington. (From a paper read before the Pharmaceutical Society, Nov. 7, 1877; *Pharm. Journ.*, 3rd series, viii., 341 and 362.) After some historical remarks, the author criticises the directions of the British Pharmacopœia, to interrupt the distillation after the first twelve fluid-ounces have passed over in order to introduce a second portion of nitric acid. Such a proceeding, when applied to the process on a large scale, involves much loss of time and injures the product. He considers a spirit containing four to five per cent. of nitrite of ethyl as a fair standard of strength for medicinal uses, and this for the following reasons:—"Five per cent. is equal to one ounce by volume in a pint. An ounce of $H N O_3$ is required to produce one ounce of nitrite of ethyl, or a pint of sp. æther. nitros.; and in the production of this ether about two ounces of spirit of ·835 specific gravity will be decomposed, and one ounce or more of water formed. These are the quantities that come out in practice, but several conditions may exist to change these results. It follows from the foregoing that

there would be three grains (measure) of the nitrite of ethyl in sixty grains of such spirit, and if there be any analogy between the ethylic and the amylic ether, one would conclude that a dram would be a full dose." It therefore appears to the author undesirable, both from a medical and a commercial point of view, to have this preparation either stronger or weaker. A number of trade specimens which he examined fell lamentably short of the standard above mentioned. Some contained only a fraction of 1 per cent., and others none at all; in one instance the spirit appeared to be only a weak solution of aldehyde, while in some other cases the small quantity of ether that may at one time have been present had disappeared by decomposition, accelerated by an excess of water. The specific gravity of a good preparation ought not to be higher than ·845.

In the discussion which followed the reading of Mr. Rimmington's paper, Profs. Attfield and Redwood stated that the oily substance which chloride of calcium separated from the spirit, and which by many is supposed to be nitrite of ethyl, contained a large proportion of aldehyde, some alcohol, and certainly less than half its bulk of nitrite of ethyl; but its exact composition was as yet unknown.

Nitrite of Ethyl. J. Williams. (From a paper read before the Pharmaceutical Society, Dec. 5, 1877; *Pharm. Journ.*, 3rd series, viii., 441.) From the crude alcoholic solution obtained by passing a slow current of nitrous acid gas through cold strong alcohol, pure nitrite of ethyl can be prepared without difficulty by fractional distillation, since its boiling point is 61° F., whereas, aldehyde boils at 90° F., and alcohol at 180° F. Some precautions, however, are necessary to ensure the purity of the preparation. The flask containing the crude product is placed in a water bath, and connected by bent tubes with several other flasks and bottles. The first tube should be passed into a small empty flask, this will condense most of the alcohol which may pass over during the operation. Then a second bent tube passes into a second flask containing a little water; this condenses any alcohol which may not have been stopped in the first flask, together with free acid and nearly all the aldehyde. From this wash bottle a third tube proceeds into a somewhat shallow flask, containing a strong solution of caustic potash; the gas is, however, not allowed to pass through this alkaline liquid, but simply over the surface. In this way the last portion of aldehyde is absorbed, and the potash solution gradually assumes an amber colour. From this vessel the gas (for such at the ordinary temperature of the laboratory the nitrite of ethyl is—in very cold weather it would

be necessary to gently warm the different flasks) is passed through a tube charged with anhydrous chloride of calcium to absorb moisture, and the pure and dry nitrite of ethyl thus produced finally passes into alcohol, which readily absorbs it. It is only necessary to note the weight of the alcohol used for absorbing the gas and its weight at the end of the operation to know the strength or percentage of nitrite of ethyl which must be in solution. Thus if 9 ounces alcohol becomes 10 ounces, it is evident we have a solution of 10 per cent.; if it becomes 12 ounces, then the strength must be 25 per cent., and so on. Specimens were exhibited of 5, 10, 25, and 50 per cent. solutions thus obtained. Ordinary spirit will answer for condensing the nitrite of ethyl, but it is better to use absolute alcohol, as it is very desirable to avoid the presence of water in any form. The solutions made with weaker spirit soon turn acid; those made with absolute alcohol, on the other hand, keep a long time. It is true the very strong solutions of 50 and 25 per cent. show traces of acidity when tested with moistened litmus paper, but the 10 per cent. solution is quite neutral.

The distillation must be conducted at the very lowest possible temperature; in fact, the water in the water bath should only be kept gently warm, and the process should be continued only so long as the conducting tubes feel cool to the touch; when they become warm the distillation should be discontinued. By passing the gas into a tube in a freezing mixture, instead of into alcohol, the pure nitrite of ethyl is readily obtained in a liquid form; it is, however, necessary to seal the tube, otherwise the very volatile liquid would soon be lost.

These solutions of nitrite of ethyl in absolute alcohol possess the following characters:—The 50 and 25 per cent. solutions, as already mentioned, are slightly acid; the 10 and 5 per cent. are neutral. They are not coloured brown by caustic potash, even when boiled. The sp. gr. is as follows:—

At 60° F.	10 per cent.	. . . . .	·810
,,	25 ,,	. . . . .	·824
,,	50 ,,	. . . . .	·850

When treated with saturated solution of chloride of calcium, as sweet spirit of nitre is ordered to be tested in the Pharmacopœia, the following results are obtained:—

The 50 per cent. gives a separation of 48 per cent. of oily liquid by measure.

The 25 per cent. gives quite 23 per cent.

The 10 per cent. gives only 5 per cent.

The 5 per cent. gives a thin but decided oily film, not quite sufficient to measure, but quite tangible.

Now, considering that the nitrite of ethyl is a heavier body than the alcoholic solution tested, it having a specific gravity of ·947, it appears that the stronger solutions yield very nearly, if not quite, the whole of the nitrite in a free state, but the 10 per cent. solution suffers a loss apparently of about 40 per cent.; and the 5 per cent. solution of nearly the whole of the nitrite.

A solution prepared by such a process as the foregoing, and containing a definite percentage of pure nitrite of ethyl, may, the author thinks, at some future day replace the officinal process which can never yield a definite and constant product. Mixing certain ingredients in a retort and distilling something out is not exactly a process which modern chemistry can recognise as a proper one if a definite product is desired. The product will vary even if the proportion of ingredients be kept exact, by many circumstances —the quantity acted upon, the temperature at which the process is carried on, even the shape and kind of apparatus would all have an effect in altering the nature of the product.

The chloride of calcium test requires care to avoid a loss of nitrite of ethyl resulting from the elevation of temperature in mixing its spirituous solution with the test. Mr. Williams employs a tube twenty-seven inches long and about three-eighths of an inch in diameter, sealed at one end and divided into two unequal portions: one, the lower division, being of twice the capacity of the upper, and containing 400 grains; the upper division, containing 200 grains, is also graduated into 2-grain divisions,—thus each graduation represents one per cent. of the oily liquid which may separate. The solution of chloride of calcium is poured into the tube until the proper mark is reached: the solution of nitrite of ethyl (or spirit of nitre, as the case may be) is then gently poured on the top to the proper point; the tube is then corked, but not too tightly, for fear of its bursting. The tube should now be placed under a tap of running cold water and gently inverted, and then in about a minute reversed, and this repeated very slowly, and with the stream of water constantly passing over the tube, several times; in about three minutes the two liquids will have been sufficiently mixed, and the nitrite of ethyl, separated as an oily liquid, floating in the upper part of the tube; but even when this operation is most carefully conducted it is probable some loss of the volatile liquid is incurred.

Glycerin in Pharmacy. C. J. Biddle. (*Amer. Journ. Pharm.*,

1878, 19.) Of the discoveries of Scheele, glycerin is one of the most important and useful. Although nearly a century has passed since its discovery, it has been in extensive use but for comparatively few years; improvements in the mode of production have both increased its purity and reduced its cost to the consumer, so that at present its uses in the arts and manufactures are innumerable.

Glycerin entered the list of preparations of the Pharmacopœia in 1850, and was transferred to the materia medica list in 1860; about this period it appeared to be beginning to claim the notice of pharmacists, as in 1865 Mr. A. Taylor recommended its use in the manufacture of fluid extracts, and since then numerous formulæ have appeared in the pharmaceutical journals, the result of which was that the present edition of the United States Pharmacopœia contains a list of preparations called "Glycerita," and glycerin enters into about thirty-six other officinal preparations. Its use is not limited to the few non-officinal, and it can be advantageously used in many more preparations. Every pharmacist has a just pride in having his preparations to present an elegant appearance, and glycerin will be found useful as a help to accomplish this purpose.

The property glycerin possesses of preventing tincture of kino from gelatinizing has been known for some time, and frequently published.

In 1874, at the request of Mr. W. F. Bender, chief apothecary at the Philadelphia Hospital, the author began to use glycerin in the syrup of wild cherry, and has used it since that time, always obtaining a much richer-looking syrup than the officinal, which contains all the virtues of the bark. The formula is as follows:—

℞	Wild Cherry, in moderately fine powder .	℥v.
	Sugar, granulated	℥xxvj.
	Glycerin, concentrated	℥ij.
	Water	a sufficient quantity.

Mix one ounce of glycerin with four of water, moisten the powder and allow it to stand thirty-six hours in a close vessel; then pack it firmly in a conical percolator, and gradually pour water mixed with the remaining glycerin until a pint of filtered liquid is obtained; then proceed as usual. A formula somewhat differing from this in the details has been recommended in the *Druggist's Circular*, 1874, 59.

Glycerin has also been found useful in the preparation of several of the officinal tinctures, for the different classes of which it is to

be used in different proportions. For the resinous tinctures, half an ounce in a pint is quite sufficient; it will produce a percolate of much richer colour, and will more thoroughly exhaust the drug. For the astringent and those containing large quantities of colouring matter, one ounce in a pint will prevent precipitation for a much longer time than without it.

By following the general formula given below very fine tinctures are produced, taking tincture of myrrh for example :—

℞	Myrrh, in fine powder	ʒiij.
	Glycerin, concentrated	ʒi.
	Stronger Alcohol	Oj.
	Alcohol . . . . a sufficient quantity.	

Mix the glycerin with five ounces of stronger alcohol, and pour upon the myrrh, previously placed in a wide-mouthed bottle of sufficient capacity; cork tightly, and allow it to stand for four days, with occasional agitation; then place it upon a filter, in a funnel, and allow the first added menstruum to filter through; mix the remaining stronger alcohol with one pint of alcohol, and gradually pour upon the myrrh, adding sufficient alcohol to obtain two pints of tincture.

Maceration followed by percolation produces a much finer tincture than direct percolation; in all tinctures for which glycerin is used, the author advises to keep them of the full alcoholic strength of the Pharmacopœia.

Glycerin has another very desirable effect in resinous tinctures, as it prevents the accumulation of resin about the stopper and lip of the bottle, and will prevent the stopper from becoming fastened; also, "the drop" that falls on the outside of the bottle, from time to time can be easily removed with a dampened cloth; for these advantages alone it would more than compensate for the amount of alcohol necessarily used to cleanse the bottles containing such tinctures. Glycerin was recommended in compound tincture of cinchona as early as 1872. (*Druggist's Circular*, 1872, 96.)

In the officinal wines it may be used with advantage also. Wine of ergot, of superior quality, possessing a stronger odour and a richer colour than the officinal, is made as follows: —

℞	Ergot, in moderately fine powder . .	ʒiv.
	Glycerin, concentrated	ʒiss.
	Sherry Wine . . . a sufficient quantity.	

Mix the glycerin with five ounces of sherry wine, moisten the powder with this; place in a close vessel and let it stand four days;

then transfer to a funnel or percolator, press firmly and gradually, pour sherry wine upon it until two pints of filtered liquid are obtained. This method is to be preferred to making this preparation from the fluid extract, and it is suggested that wine of ipecacuanha be made in a similar manner, and that glycerin be used in the remaining wines.

In the preparation of solid extracts a small proportion has been recommended to be added, after evaporation to the proper consistence, to give them plastic firmness, which is at times very desirable, and also prevents moulding.

As an excipient in pill masses, its virtues are too well known to need repetition here. It may be substituted for honey in compound tincture of cardamom, and produce quite as richly coloured a tincture; but in the camphorated tincture of opium the colour is not so rich as in the officinal.

Glycerin has been recommended to take the place of carbonate of magnesium in the officinal waters made from oils; but does not produce as good results as with the latter. It will not answer for camphor water, as camphor is not sufficiently soluble in glycerin, even when heated; for the camphor will volatilize before the glycerin is hot enough to dissolve it. But in extracts, mixtures, tinctures, and wines of the Pharmacopœia glycerin will be found useful.

Glycerinum Tragacanthæ as an Excipient. G. Welborn. (*Pharm. Journ.*, 3rd series, viii., 281.) The author's remarks are in continuation of a paper read at the Glasgow meeting of the British Pharmaceutical Conference. (See *Year-Book*, Transactions, p. 522.)

1. The present condition of a mass of pil. aloes et ferri weighing about two ounces, and prepared on May 26, 1876, is as follows: aroma, very good and fresh; consistency, rather hard, but yields to pressure of the thumb and fingers. A section exhibits numerous minute crystals of ferrous sulphate interspersed throughout the mass. A portion being cut off from the mass and rolled upon a pill machine, crumbles down and does not admit of being formed into pills. Nevertheless, if it be worked for a short time under a pill pestle, it still forms an exceedingly good and plastic mass—capable of easy extension for cutting into pills, which are beautifully rounded off, and present the appearance of having received a coating of varnish. The above-mentioned mass retained its original consistency for some six months, until, in fact, it had been exposed for some time to the heat of a very warm room during last winter.

2. A small mass (about one ounce) of pil. aloes et myrrhæ,

prepared twelve months ago, has become too hard to roll out without being first subjected to some amount of labour in the pill mortar. It then becomes soft and plastic, but displays a want of adhesiveness apparently due to the essential oil contained in the myrrh, so that when the pills are cut they frequently split in halves. The aroma of the mass is as fresh and powerful as when first compounded.

3. A small mass of pil. rhei composita, now fifteen months old, still retains a nice consistency, and may be readily cut with a pill knife. It does not, however, roll well, the cause of failure manifestly being due to the oil of peppermint, since the oil has a tendency to ooze out and form a non-adhesive surface. If the precaution be taken of previously working up the requisite quantity of mass in a pill mortar, it speedily becomes soft and may be readily rolled out.

From a careful consideration of the foregoing observations, it may be gathered, that although the glycerin and tragacanth excipient preserves certain of the official pill masses in good condition for a much longer period than those ordered in the Pharmacopœia, yet it has not altogether sustained the expectations formed of it; for while it succeeds admirably—nothing better—for making nine out of every ten of physicians' prescriptions met with in the daily routine of a dispensing establishment, it must be confessed that the official formulæ thus prepared gradually assume a condition, after being kept several months, which necessitates the use of the pill mortar before they can be formed into pills.

Experiments were undertaken with the view of ascertaining the solubility of pills above mentioned when merely exposed to the action of cold water. Three grains each of the following pills were taken: pil. aloes et ferri, pil. aloes et myrrhæ, and pil. rhei composita. These were placed in separate test tubes, containing a small quantity of cold water, in the evening, and allowed to stand undisturbed during the night. Next morning the pil. ferri and pil. rhei had increased in bulk, and upon slightly shaking the tubes the pills were completely disintegrated and diffused through the liquid. The pil. aloes et myrrhæ was not so much acted upon by the water; it was, however, easily broken up and diffused when stirred with a glass rod.

The physiological activity and therapeutic efficacy of pills made up with the tragacanth excipient is placed beyond doubt when taken in the diminished dose of three grains for five grains of the B. P. formula.

With reference to another excipient for pil. aloes et myrrhæ, the author observes that a mixture of one part of glycerin and three parts of treacle possesses the property of preserving the above mass in perfect condition for the space of six years with every probability of keeping good and fresh for another like period.

It is, therefore, a subject worth serious consideration, whether the use of a mixture of glycerin and treacle as an excipient, in easily regulated and suitable proportions, might not advantageously be extended to other official pill masses, *e.g.* pil. rhei composita, pil. colocynth. composita, and pil. asafœtidæ composita.

Oily Seeds as Deodorisers. A. Huber. (*Schweiz. Wochenschr.*, 1877, 84.) A short time ago F. Schneider called attention to the value of black mustard as a deodorising agent. The odours of cod liver oil, musk, valerianates, and many other drugs, can be rapidly removed by it from the hands, mortars, utensils, scales, etc. (See *Year-Book of Pharmacy*, 1877, 241.)

The author finds that ground flax-seed, almonds, and other oily seeds, when powdered and mixed with a little water, have the same effect as mustard. The explanation of this action is somewhat doubtful, but it is not improbable that the odorous bodies are dissolved by the fatty oil of the seed, and emulsionized by the contact with water. In the case of bitter almonds and mustard, the development of ethereal oil, under the influence of water, may perhaps be an additional help to destroy foreign odours. The author also mentions that the smell of carbolic acid may be removed by rubbing the hands with damp flax-seed meal, and that cod liver oil bottles may be cleansed with a little hot sesame or olive oil.

Tincture and Ammoniacal Tincture of Guaiacum. J. D. Williams. (*Amer. Journ. Pharm.*, 1877, 551.) The writer proposes the following modification of the officinal process:—Six troy ounces of guaiacum resin in powder No. 40 are mixed with one and a half pints of alcohol in a half gallon bottle, and set aside in a warm place for twenty-four hours. The liquid is then poured off, the undissolved portion packed into a funnel, the alcoholic liquid first poured upon it, and the percolation finished with alcohol until two pints of tincture have been obtained. The ammoniacal tincture may be conveniently made in the same manner. The amount of insoluble residue depends upon the purity of the guaiacum resin.

Unguentum Hydrargyri Nitratis. J. A. Gingrich. (*Ibid.*, 551.) Purified ox marrow is recommended by the author as the base for this ointment. The process found to answer best is that first suggested by Mr. R. Rother, in 1871. The fat is fused, and

at a moderate heat treated with one half the nitric acid ordered by the Pharmacopœia, and after the reaction has ceased, the mercury, dissolved in the other half of the nitric acid, is added. Thus prepared, it retains its handsome colour for a long time.

Unguentum Hydrargyri Nitratis. M. Patrouillard. (*L'Union Pharmaceutique*, 1877, 325.) The author has experimented on the most suitable temperature at which the fatty substances should be at the time when the mercurial solution is to be added. He found that high temperatures, such as they had been recommended by various observers, or prescribed by some pharmacopœias, are disadvantageous. During one trial, in summer time, he allowed the temperature of the previously melted fats to fall to 38° C. (100° F.) before adding the mercurial solution; on now stirring the mixture a steady rise of the thermometer was observed as soon as the rise of nitrous vapours indicated the commencement of the reaction. When the temperature has risen to 42° C. (107·6° F.), it remains stationary, but very soon sinks again; and when it has fallen to 37° C. (98·6° F.), the mixture begins to thicken. It may then be poured into moulds to cool.

Saturation Table of Salicylic Acid. Dr. H. Hager. (From *New Remedies*, 1877.) Saturated or neutral solutions of sodium salicylate may be prepared by the following table :—

5·0	of Salicylic Acid	require	3·25	of Sodium	Carbonate.
6·0	,,	,,	3·90	,,	,,
7·0	,,	,,	4·55	,,	,,
8·0	,,	,,	5·20	,,	,,
9·0	,,	,,	5·80	,,	,,
10·0	,,	,,	6·50	,,	,,

Or, to state it more correctly, the weight of salicylic acid, multiplied by 0·65, gives the weight of sodium bicarbonate necessary for saturation.

If it is desired to use crystallized sodium monocarbonate, the proportions will be as follows :—

5·0	of Salicylic Acid	require	5·2	of Sodium	Carbonate.
6·0	,,	,,	6·3	,,	,,
7·0	,,	,,	7·3	,,	,,
8·0	,,	,,	8·3	,,	,,
9·0	,,	,,	9·4	,,	,,
10·0	,,	,,	10·4	,,	,,

Or, to state it more exactly, the weight of salicylic acid, multiplied with 1·04, gives the weight of sodium carbonate necessary for saturation.

The Tinctorial Power of some Pharmacopœia Preparations. W. Gilmour. (*Pharm. Journ.*, 3rd series, viii., 181 and 383.) In the following colorimetric experiments, the plan pursued was to estimate the amount of light transmitted through a known strength of solution, and reduce it to degrees for purposes of comparison, etc. This is most readily accomplished by a simple adaptation of the spectroscope, in which the spiderweb micrometer is brought to the exact point of complete absorption of the light, when the amount transmitted can easily be calculated. Take, for example, ordinary tincture of iodine, which contains about 10·9 grains of iodine to the ounce, place it in a graduated burette, and estimating the total amount of light transmitted at 20°, we find that for each single degree of light passing through beyond that amount, there will require to be a reduction of iodine in the solution to the extent of a grain and a fraction to the ounce in uniform proportion, thus:—

10·9 grains	Iodine	in 1 oz.	= 20°	transmitted	light.
9·5	,,	,,	= 21°	,,	,,
8·2	,,	,,	= 22°	,,	,,
6·8	,,	,,	= 23°	,,	,,

The ratio here is nearly uniform, but if instead of the tincture we take an aqueous solution, say the volumetric solution, which contains about 5·5 grains to the ounce, it will be found that instead of continuing uniform as above, which would indicate about 24°, it immediately leaps to 31°, whilst the reduction of iodine in the aqueous solution by a grain and a fraction, as in the previous instance, raises it to 36°. Thus:—

5·5 grains	Iodine	in 1 oz.	aqueous solution	= 31°	
4·1	,,	,,	,,	,,	= 36°

From which, as well as from other experiments, not thought necessary to note, we have brought out the interesting facts, namely, that an aqueous solution has not the same tinctorial power as an alcoholic of the same strength, and that very dilute solutions raise the amount of transmitted light in unequal increments.

Not less interesting was the experiment with two different samples of tincture of opium,—the one tincture made from a good sample of opium, the other from what is known as a good second. In bulk, the appearance of the two tinctures was not unlike, although on closer examination in smaller volume, that made from the second opium was not quite so deep in colour. Still, from a general examination it might have passed for ordinary tincture of opium, B. P., and certainly no one could have been prepared for the extra-

ordinary difference in the amount of transmitted light on comparing the two. Thus:—

Tincture Opium 1st = 48° transmitted light.
„ „ 2nd = 60° „ „

The difference was fully explained, on further examination, by the first yielding on evaporation 5·0 per cent. dry extract, whilst the second only yielded 3·1 per cent.

Taking the first tincture again and diluting it gradually, the same uniform results were obtained as in the case of iodine, with this difference, namely, that the amount of light transmitted increased in greater ratio than the dilution; thus:—

Tincture Opium, full strength . = 48° transmitted light.
„ „ diluted 12·5 per cent. = 51° „ „
„ „ „ 25·0 per cent. = 56° „ „
„ „ „ 37·5 per cent. = 62° „ „

This last dilution, it will be noticed, corresponds very closely, not only with the amount of transmitted light, but in strength also with the second tincture, and the coincidence here is more singular, and points to conclusions which further experiments seem amply to confirm. In following out the inquiry into the relation existing between the tinctorial power and the actual strength of some Pharmacopœia preparations, the interest attached to most opium preparations led the author to continue the investigation more immediately in this direction. For this purpose a number of commercial samples were obtained and subjected, in the first instance, to an examination colorimetrically, after which, as in previous experiments, the amount which each yielded of dry extractive was determined. This method of procedure was of course here intended only to give an approximate idea of the relation existing between the colour, and strength, and not as in any way expressive of an absolute conclusion.

1. *Tincture of Opium.*

Sample.	Transmitted Light.	Dry Extract, per cent.
1.	46°	5·2
2.	48°	4·4
3.	52°	4·
4.	55°	3·2
5.	57°	3·8
6.	58°	3·5

It should here be noted that a considerable variation existed in the spirit strength of some of the tinctures, doubtless accounting to

some extent for the variation existing in some cases betwixt the amount of transmitted light and dry extract, and this we think can only be reasonably accounted for on some such supposition. The various samples in table 2 were all made from commercial extract of opium; and, with the exception of sample 1, which was made from a dry and nearly hard extract, the samples were all very much alike in appearance, consistence, etc.

2. *Liquid Extract of Opium.*

Sample.	Transmitted Light.	Dry Extract, per cent.
1.	46°	4·3
2.	50°	3·7
3.	53°	4·4
4.	53°	4·0
5.	58°	3·6
6.	59°	4·

The relation betwixt the two columns was still more marked in the case of Battley's solution of opium. Three different samples of this preparation were examined, and in all a very close approximation in strength, both colorimetrically and in extractive, was obtained.

3. *Battley's Liquor Opii.*

Sample.	Transmitted Light.	Dry Extract, per cent.
1.	45°	5·8
2.	46°	5·4
3.	47°	5·2

Now, without unnecessarily dwelling on the difference in strength of the foregoing samples, it may simply be pointed out that in the case of tincture of opium presumably made by the ordinary chemist and druggist, the extreme variation in the six samples was—in the case of transmitted light 12°, and of dry extract two per cent.; but in the case of the liquid extract of opium, made from ordinary extract, presumably obtained through some wholesale manufacturer, the variation was—in the light transmitted 13°, and only ·8 of dry extract.

In order to test a sample of tincture made under the author's personal care, four pints were "set agoing" as an experiment. Filtered, pressed, made up to measure and estimated, the result obtained was—transmitted light 57°, and dry extract 4·4 per cent., as against 53 7° transmitted light, and 4·01 per cent. dry extract, the average of six samples. Of more importance, however, was the fact that

the marc, after being subjected to the ordinary pressure (and which in its damp state weighed only a little over three ounces), on being again re-digested for twenty-four hours with 5 ounces spirit yielded a tincture which gave 65° transmitted light and three per cent. dry extract. The wisdom of the plan pursued by some manufacturers of first digesting the marc of the old preparation in the spirit of the new previous to adding the fresh opium is thus thoroughly demonstrated, and commends itself for more general adoption.

Experiments were next made with a preparation of opium, the strength of which cannot be estimated by any simple process of analysis, viz., the liniment. It has been shown that the average of transmitted light in the six samples of tincture was nearly 54°, and this was amply confirmed as a fair average by the tincture specially prepared and examined for the purpose. In the case of liniment of opium it might therefore be assumed that it should transmit much more light than this, from the fact that the tincture of opium in this preparation is diluted in equal proportions with a comparatively colourless tincture. This, however, scarcely squares with the actual facts, as shown in the following table:—

4. *Liniment of Opium.*

Sample.	Transmitted Light.
1.	47°
2.	54°
3.	55°
4.	57°
5.	66°
6.	66°
7.	71°

As a matter of fact, whatever the remainder may have been, the first two or three liniments in this table could not possibly have been made according to Pharmacopœia instructions. This was more than confirmed by the decidedly alkaline reaction which some of the liniments gave on being tested; and without entering more immediately into the matter, this probably indicates the method of their preparation as well as accounts for the depth of colour which they exhibit.

Extract of Malt as an Emulsifier. G. F. H. Markoe. (*Boston Med. and Surg. Journ.* From *New Remedies.*) The author calls attention to malt extract as an emulsive agent for cod liver oil and other oleaginous preparations. At the present time, when cod liver oil is extensively employed as a therapeutic agent, anything that

will neutralize or overcome its disagreeable oily character and bad taste will be welcomed by patients. Extract of malt possesses the power of producing a perfect emulsion with cod liver oil, and a mixture of equal parts of cod liver oil and extract of malt was exhibited, having a semi-solid consistence, in which the taste of the cod liver oil was more perfectly concealed than can be accomplished bo any other known process.

Scheme for the Recognition of the more important Resins, Gum Resins, and Balsams. E. Hirschsohn. (From the *Pharmaceutische Zeitschrift für Russland*, xvi., 81.) In continuation of the author's researches on ammoniacum, galbanum, sagapenum, and opoponax, an account of which will be found in the *Pharmaceutical Journal*, 3rd series, vii., 369, he has made a comparative examination of a large number of the more important resins, gum resins, and balsams. The following are the reagents used :—

1. Sulphuric acid, sp. gr. 1·820.
2. Alcoholic hydrochloric acid, obtained by saturating 95 per cent. alcohol with dry hydrochloric acid gas.
3. Bromine solution: 1 part of bromine in 20 parts of chloroform.
4. Saturated solution of chloride of lime in distilled water at the ordinary temperature.
5. Alcoholic solution of perchloride of iron, 1 part in 10 parts of 95 per cent. alcohol.
6. Saturated solution of neutral lead acetate in 95 per cent. alcohol.
7. Solution of ammonia, sp. gr. ·980.
8. Solution of pure sodium carbonate crystals in distilled water.
9. Frohde's test: 1 centigram of sodium molybdate in 1 c.c. sulphuric acid.
10. Impure chloral hydrate, containing alcoholate.
11. Saturated solution of iodine in petroleum spirit boiling at 60° C.

Completely Soluble in Chloroform.

Completely soluble in Ether.

A. Ethereal solution becomes turbid after addition of alcohol.

I. Alcoholic solution gives with perchloride of iron a turbidity that disappears on boiling. Chloral reagent colours violet

Canada Balsam.

II. Alcoholic solution gives no turbidity with perchloride of iron.

1. The drug is liquid and forms a clear mixture with petroleum spirit boiling below 40° C.

a. Bromine solution colours the chloroform solution yellowish, then violet and blue . *Maranha Copaiba Balsam.*

b. Bromine solution produces no colour

Peru Copaiba Balsam.

2. The drug is solid and dissolves only partially in petroleum spirit. Iodine solution colours red-violet

Ordinary Mastic.

B. Ethereal solution forms clear mixture with alcohol.

1. Perfectly soluble in alcohol.

1. Perchloride of iron colours the alcoholic solution blue.

a. Lead acetate gives a precipitate with alcoholic solution. Sulphuric acid dissolves the drug with a cherry red colour . . . . . *Guaiacum Resin.*

b. Lead acetate gives no precipitate. Sulphuric acid dissolves the drug with a yellow-brown colour

Carana Resin (*Aceyta americana*).

2. Perchloride of iron colours the alcoholic solution brownish or greenish.

a. Lead acetate gives with the alcoholic solution a precipitate that is not dissolved by boiling.

α. Sodium carbonate solution dissolves parts at the ordinary temperature. Chloral test colours the residue from the evaporation of a petroleum spirit extract gradually red-violet with blue streaks

Coniferous Balsams and Resins.

β. Sodium carbonate dissolves none or a very small quantity.

† Petroleum spirit extract colourless. Chloral test produces no colour or a very faint greenish

Bombay Mastic.

†† Petroleum extract coloured.

‡ Dark brown. Chloral test colours brown

Mani Resin.

‡‡ Yellow-brown. Chloral test colours gradually indistinct red-violet . . *Carana Resin.*

‡‡‡ Yellow-brown. Chloral test and bromine solution colour a magnificent violet . *Carana hediondu.*

b. Lead acetate gives with alcoholic solution a precipitate that dissolves on boiling.

α. Bromine solution colours red . *Peruvian Guaiacum Resin.*

β. Bromine solution produces no coloration

Alexandrian Mastic.

c. Lead acetate gives no precipitate. Ammonia gives a turbid mixture . . . . . *Dragon's Blood.*

II. Imperfectly soluble in alcohol.

1. Lead acetate produces turbidity which disappears upon warming . . . . *Brazilian Copaiba Balsam.*
2. Lead acetate gives no precipitate. The drug is clearly crystalline. Sodium carbonate does not dissolve it by boiling.

a. Bromine solution gradually colours green.

† Alcoholic hydrochloric acid colours violet, blue, or brown . . . . . *Elemi.*

b. Bromine solution colours violet . . . . *Elemi.*

c. Bromine solution produces no colour

Elemi (*Amyris elmifera*).

Imperfectly soluble in Ether.

A. Perfectly soluble in alcohol.

I. Sulphuric acid colours the residue from evaporation of a petroleum spirit extract cherry red. The drug is free from cinnamic acid . . . . . *Siam Benzoin.*

II. Sulphuric acid does not colour such residue, or only faintly light brown. Contains cinnamic acid

Sumatra Benzoin or *Tolu Balsam.*

III. Sulphuric acid colours such residue yellow-brown, passing into violet . . . . . *Black Peru Balsam.*

B. Imperfectly soluble in alcohol.

I. Perchloride of iron gives a precipitate, which is neither dissolved by boiling nor soluble in ether . *Brazilian Copal.*

II. Perchloride of iron produces no turbidity, or only a slight one that disappears on boiling.

1. The ethereal solution gives with alcohol a turbid mixture.

a. Alcoholic hydrochloric acid colours it brownish. Chloral test colours evaporation residue of petroleum spirit extract greenish . . . . . *Dammar.*

b. Alcoholic hydrochloric acid colours it brick red. Chloral test colours the petroleum spirit residue carmine red to violet . . . . *White Peru Balsam.*

Ethereal solution gives with alcohol a clear mixture.

a. Ammonia gives with alcoholic solution a clear mixture. Bromine solution colours blue . *Ceradia Resin.*

b. Ammonia gives with the alcoholic solution a turbid mixture. Bromine solution colours greenish

Mecca Balsam.

IMPERFECTLY SOLUBLE OR INSOLUBLE IN CHLOROFORM.

Completely soluble in Ether.

A. Ethereal solution red. Ammonia gives with alcoholic solution a clear mixture . *Dragon's Blood from Pterocarpus Draco.*
B. Ethereal solution yellowish or colourless.
  I. Alcoholic solution gives with lead acetate no precipitate *Podocarpus Resin.*
  II. Alcoholic solution gives with lead acetate a precipitate that is not dissolved by boiling . . . . *Sandarac.*

Imperfectly soluble in Ether.

A. Ethereal solution becomes turbid after addition of alcohol.
  I. Alcoholic solution gives with ammonia a clear mixture.
    1. The mixture with ammonia is yellow. The solution of the resin in sulphuric acid is yellow-brown, and gives with alcohol a clear violet mixture . . *Eryops Resin.*
    2. The mixture with ammonia is carmine red . *Sonora Lac.*
  II. Alcoholic solution gives with ammonia a turbid mixture.
    1. Perchloride of iron colours green. The drug contains cinnamic acid. Lead acetate gives a precipitate *Liquid Storax.*
    2. Perchloride of iron colours brownish or not at all.
      a. The drug contains cinnamic acid, and gives with lead acetate no precipitate . . *Liquidambar Balsam.*
      b. The drug contains no cinnamic acid, and gives with lead acetate a precipitate . *Euphorbia Tirocalli Resin.*
B. Ethereal solution gives with alcohol a clear mixture.
  I. Perfectly soluble in alcohol. Perchloride of iron colours dark brown or black.
    1. Solution in alcohol is red.
      a. Lead acetate gives no precipitate. Chloroform extract colourless . *Xanthorrhœa quadrangularis Resin.*
      b. Lead acetate produces turbidity. Chloroform extract yellow . . . *Xanthorrhœa arborea Resin.*
    2. Alcoholic solution yellow. Lead acetate produces a precipitate . . . . *Yellow Xanthorrhœa Resin.*
  II. Imperfectly insoluble in alcohol.
    1. Alcoholic solution gives with ammonia a clear mixture.
      a. Ammoniacal mixture is violet. Lead acetate gives a violet precipitate . . . . . *Lac.*
      b. Ammoniacal mixture is yellow or colourless.

α. Perchloride of iron colours the alcoholic extract black. Lead acetate gives no precipitate . . *Gamboge.*

β. Perchloride of iron gives a precipitate which is neither soluble in ether or by heating. Lead acetate gives a precipitate.

† Readily and completely soluble in ether-alcohol.

‡ Bromine solution precipitates the resin from the chloroform solution . . *Australian Copal.*

‡‡ Bromine solution produces no precipitate *Manilla Copal.*

†† Imperfectly soluble in ether-alcohol *East Indian Copal. African Copal.*

2. The alcoholic solution gives with ammonia a turbid mixture.

a. Perchloride of iron gives a precipitate that is neither dissolved by boiling nor in ether . *Borneo Copal.*

b. Perchloride of iron gives no precipitate.

α. Completely soluble in ether-alcohol. Chloral test colours residue from evaporation of petroleum spirit extract blue to blue-violet *Liquidambar styraciflua Balsam.*

β. Incompletely soluble in ether-alcohol.

† The drug contains sulphur.

§ Yields umbelliferon by dry distillation.

‖ Hydrochloric acid colours the petroleum spirit extract residue reddish yellow; the chloral test colours it green . *Persian Sagapenum.*

‖‖ Hydrochloric acid colours the residue blue-violet; chloral test colours it rose colour to raspberry red and violet *Levant Sagapenum.*

‖‖‖ Not coloured by hydrochloric acid. The solution of the drug in sulphuric acid is yellow-brown with a blue fluorescence. Potassium nitrate colours the gum resin malachite green *Ordinary Asafœtida.*

§§ Yields no umbelliferon by dry distillation.

‖ Sodium carbonate solution colours the drug light brown, and the extract is not altered by acetate acid or lead acetate *Asafœtida from Ferula alliacea.*

‖‖ Sodium carbonate solution forms an emulsion that cannot be filtered.

° Lead acetate gives no precipitate. Iodine solution is not altered . *Indian Bdellium.*

°° Lead acetate produces immediately or after a short time a precipitate that dissolves upon warming. Iodine solution is not altered
African Bdellium.

‡‡ The drug contains no sulphur.

§ Yields umbelliferon by dry distillation.

||| The petroleum spirit extract residue is coloured by hydrochloric acid and the chloral test.

° Hydrochloric acid colours reddish yellow; the chloral test colours green
Persian Galbanum.

°° Hydrochloric acid colours red-violet; the chloral test colours greenish . *Levant Galbanum as at present in commerce.*

°°° Hydrochloric acid colours violet-blue; the chloral test carmine red . . *Older specimens of Levant Galbanum.*

|| Hydrochloric acid gives no colour; the chloral test colours light brown
African Ammoniacum.

§§ Yields no umbelliferon by dry distillation.

|| Chloride of lime solution colours the gum resin orange yellow . *Persian Ammoniacum.*

||| Chloride of lime solution produces no colour. Lead acetate gives no precipitate.

° Iodine solution is not altered; the chloral test colours greenish . . . *Olibanum.*

°° Iodine solution is not altered; the chloral test gives no colour . . *Indian Myrrh.*

|||| Chloride of lime solution produces no colour. Lead acetate gives a precipitate.

° Bromine solution colours violet red; the chloral test colours violet . *Ordinary Myrrh.*

°° Bromine solution produces no colour or only yellowish. Perchloride of iron colours green
Opoponax.

°°° Bromine solution produces no colour, or only yellowish. Perchloride of iron colours brownish . . . . *Euphorbium.*

Antidotes. (*British Medical Journ.*, Dec. 22, 1877.) The French medical profession have frequently occupied themselves with the

endeavour to add to their pharmacopœia an antidote which would answer the purpose in the majority of accidental poisonings, and which could always be kept at hand, so that it might be administered at once, before more special indications had the time to develop themselves, either according to information and anamnestics, which are often wanting in cases of accident, or according to symptoms noted by observation of the patient. M. Mialhe has highly recommended for this purpose hydrated sulphide of iron, mixed with calcined magnesia. This is a good antidote for the metallic salts, which it deoxidizes and changes into harmless sulphurets. But this antidote has the disadvantage of disengaging sulphydric acid in the presence of acids. It requires great nicety in preparation, and is difficult to keep. M. Dorvault has proposed in cases of alkaloid, cyanic, and metallic poisonings, an antidote composed of equal parts of calcined magnesia, peroxide of iron, and washed powder of animal charcoal. This mixture also, however, changes if it be kept some time. M. Jeannel proposes to keep separately (1) a solution of sulphate of iron; and (2), a mixture of 80 grams of calcined magnesia, and 40 grams of animal charcoal in 800 grams of distilled water. This mixture, added at the moment of using to the solution No. 1, forms the antidote, which is to be administered in successive doses of from 50 to 100 grams (about one and three quarters to three and a half ounces). This antidote renders preparations of arsenic, zinc, and digitalis insoluble. It completely saturates free acid, and only acts partially on the alkaline hypochlorites, and the oxide of copper. It also leaves in solution a small amount of morphia and strychnia, and the oxide of mercury in notable quantity. Professor Ranieri Bellini has made a communication to the Medico-Physical Society of Florence, on the iodide of starch, which MM. Bouchardat and Quesneville were the first to introduce into therapeutics, and frequently employed in cases which required an active alterative medication, when the stomach refused to tolerate iodine in any other form. The iodide of starch is a chemical antidote which is specially appropriate to poisoning by sulphur, by the alkaline or earthy sulphurets, by caustic alkalies, ammonia, or any of the alkaloids. It is also an eliminating agent, very useful in the treatment of long-standing metallic poisonings, especially those resulting from lead or mercury. Dr. Bellini advises that the patient should always be made to vomit soon after the administration of the antidote, to rid him of the chemical products which result from the decomposition of the toxic agent, which in their turn might likewise become decomposed.

Dialysed Iron as an Antidote for Arsenic. R. V. Mattison. (*Amer. Journ. Pharm.*, 1878, 23.) The author has made a number of experiments with the object of testing the asserted value of dialysed iron as an antidote in cases of arsenical poisoning.

1. Ten centigrams of arsenious acid was dissolved in 25 c.c. of distilled water, and tested for arsenic, abundant evidence of which was readily shown. To this solution 5 c.c. of a 5 per cent. solution of dialysed iron was added, and the whole diluted with distilled water to the measure of 100 c.c., and filtered. No apparent change was effected, the filtrate giving abundant evidence of the presence of arsenic. The experiment was again performed, substituting ordinary water, with like result.

2. A like quantity of arsenious acid was dissolved in the same amount of distilled water as before, with the addition of a few drops of hydrochloric acid, and to this solution 5 c.c. of solution of dialysed iron was added, and the filtrate tested as before, with like result. The experiment was then varied by the substitution of ordinary water and the addition of, first, 1 c.c. of the iron solution, and afterwards the addition of 25 c.c. and dilution of the whole with water to the measure of 100 c.c.; the various testings were without change, the abundance of arsenic being readily shown.

3. Ten centigrams of arsenious acid being taken as before, and dissolved in the same quantity of water, this was added to 1000 c.c. of a solution made to represent the gastric secretion of the human stomach, and composed as follows:—

Water	994·40
Pepsin	3·19
Chloride Sodium	1·46
Chloride Potassium	0·55
Chloride Calcium	0·06
Hydrochloric Acid	0·20
Phosphate Magnesium	0·12

The quantity of this fluid taken (1000 c.c.) was believed to represent about the normal quantity of gastric juice present in the human stomach during digestion, or that would be induced upon the ingestion of a quantity of arsenic. Immediately after the addition of the iron solution, the whole was transferred to a filter, and the colourless filtrate tested by Fleitmann's and Marsh's test. No evidence of the presence of arsenic could be discovered, and the experiment was repeated with like result.

The experiment was then varied by dissolving 50 centigrams of arsenious acid in the above quantity of artificial gastric fluid, and

allowing the whole to remain at a temperature of 38° C. (100° F.) for two hours, with occasional agitation. The mixture was then transferred to a filter, and 100 c.c. of the filtrate evaporated at 5 c.c., and this added to a Marsh's apparatus of 100 c.c. capacity, without the slightest trace of arsenic being shown on the application of the test.

This experiment was repeated with like result with both Fleitman's and Marsh's tests, without a trace of arsenic being obtained.

After the repeated unsuccessful attempts to detect the presence of arsenic in this way, one drop of liquor arsenii chloridi was added to each flask (still containing the filtrates as above described), and the result was immediate, the presence of arsenic in considerable quantity being instantly shown by the characteristic reactions.

Through these experiments, then, the facts seem clearly set forth, (1) that dialysed iron, to be of value as an arsenical antidote, must be first precipitated by the action of some neutral salt; (2) that this precipitation and the consequent production of ferric hydrate, is accomplished when this preparation is taken into the stomach; and that (3) therefore the solution of dialysed iron is a valuable antidote for arsenical poisoning, and should be administered promptly in cases of emergency, followed, of course, by an emetic, until more efficient remedies can be used.

As the stomach of a patient may possibly not always contain a sufficient amount of gastric juice, the author thinks it a wise precaution to follow the administration of the antidote immediately by a teaspoonful or more of sodium chloride, thus insuring the formation of ferric hydrate, and the consequent neutralization of the poison.

A natural proof of the antidotal powers of dialysed iron was afforded in a case of arsenical poisoning which occurred a short time after the publication of the author's paper, and was published in the *Philadelphia Medical Times*.

Dialysed Iron as an Antidote in Poisoning by Arsenious Acid. W. Gibbons. (*Pharm. Journ.*, 3rd series, viii., 1001.) The experiments recorded in this paper supply further evidence of the value of dialysed iron as an antidote for arsenic. The author recommends the antidote to be preceded or immediately followed by a large dose of magnesia, or bicarbonate of soda, to ensure the formation of ferric hydrate.

Glycerin of Pepsin. M. Andouard. (*Journ. de Pharm. et de Chim.*, August, 1877.) The author recommends the addition of chloride of sodium to the scrapings of the inner coat of the stomach

(in order to precipitate the pepsin) and the purification of the precipitate from the salt by means of dialysis. The solution of pepsin left in the dialyser is mixed with an equal weight of glycerin, and thus yields a preparation which will keep unimpaired for a few years.

The Detection of Alcohol as an Adulterant in Essential Oils. E. W. Davy. (*Pharm. Journ.*, 3rd series, viii., 201.) A short time ago the author recommended a solution of molybdic acid in strong sulphuric acid as a test for alcohol (see *Year-Book of Pharmacy*, 1877, 109). He now shows that this test may be advantageously employed in the examination of essential oils, and gives the following directions for this purpose:—

A glass tube of about four inches in length and of about a quarter of an inch in diameter in its internal bore was taken, one end of which, being heated, is drawn out to a point and closed so as to still leave a very small hole, whilst the edges of the other end are merely rounded by fusion; and to this latter is adapted a sound, well-fitting cork, or better still, an india-rubber stopper capable of closing the aperture perfectly air-tight. The small hole being closed by one of the fingers placed firmly against it, the tube is filled to about one-third of its contents with distilled water, and then about an equal volume of the essential oil is added. (In cases where the degree of adulteration may be small, it will be well to diminish the proportion of the water employed, so as not to dilute the adulterant too much; and where the very expensive oils are the subject of examination, smaller-sized tubes than those recommended may be employed.) The larger end of the tube is now to be tightly closed with the cork or stopper, the finger being still kept on the small hole, and the contents of the tube is then strongly agitated for a few moments; after which the pointed end is turned upwards and the finger removed, to allow the air condensed by the closing of the larger end to escape, so as to avoid unnecessary loss of the mixture. And finally the tube, being again reversed, is supported on a stand with its pointed end downwards, but not resting on it. In this upright position it is left till the oil has separated from the water and risen to the surface, which in most cases takes place in a comparatively short time, leaving the aqueous portion below quite clear, or very nearly so. When such is the case a drop or two of this portion is allowed to escape, which is easily effected, either by pressure on the cork or stopper by holding the upper part of the tube in the hand, so that its warmth may expand the contained air, or by slightly drawing out the cork (which will cause some air to enter at the

pointed end) and then pressing it in again; by one or other of these simple means the necessary quantity of the aqueous portion will be easily forced out of the tube. This, on being brought into contact with three or four drops of the molybdic solution placed in a little porcelain capsule or on any white porcelain or delf surface, will, if the oil has been adulterated with alcohol, develop after a few moments the characteristic intense blue reaction of that substance. If the quantity of alcohol present be very small, it is advisable to apply gentle heat to the mixture, as this renders the test more delicate; but the heat ought not to be raised beyond 120° F., as a higher temperature is likely to lead to erroneous results. The treatment of the oil with water is an essential condition of the test, as the direct addition of the oil to the test solution would, almost certainly, lead to failure. Should the oil from its density not rise readily to the surface of the water after agitation, the difficulty may be overcome by adding to the contents of the tube a little sulphate of magnesia, which, dissolving in the water and increasing its density, will, if employed in sufficient quantity, cause the oil to rise to the surface, leaving the watery portion below clear and suitable for testing with the molybdic solution.

Pure essential oils, when tested in strict accordance with the author's directions, will either produce no coloration at all with the reagent, or, what is more frequently the case, there will be a faint light brown or yellowish brown tint produced; or lastly, in some few instances a light olive or grey is developed, quickly changing to the former tints, all of which soon fade away, leaving the mixture colourless, or very nearly so. But if the oil is adulterated with alcohol, the water dissolving out that substance, a drop or two of the aqueous portion develops with the test solution, after a few moments, the deep azure blue coloration which is so characteristic of that substance; and this is much more permanent, generally speaking, than the shades of colour caused by the essential oils alone when so treated, though even this, as in their case, will fade away, leaving the mixture colourless, or very nearly so, after a shorter or longer exposure to the air.

The test solution is prepared by dissolving, with the aid of a gentle heat, one part of molybdic acid in ten parts by weight of pure and concentrated sulphuric acid. This solution should be kept in a well-stoppered glass bottle, as it quickly absorbs moisture, becoming too dilute, and is otherwise injured, if it is left exposed to the air.

Tincture of Cantharides. W. Kennedy. (*Amer. Journ. Pharm.*,

1878, 64.) The author finds that the rectified spirit answers better than proof spirit in the preparation of this tincture, for the following reasons :—

1. Because diluted alcohol does not dissolve the cantharidin, the active and vesicating principle of the drug, so well as alcohol. The author, to satisfy his curiosity, collected and preserved the dregs after making several quantities of the tincture as prepared by Pharmacopœia, dried them, and in a percolator submitted them to the action of alcohol until completely exhausted. The alcoholic tincture was evaporated on a water bath to about the consistence of simple cerate; a small plaster was made and applied, which in the course of an hour produced redness of the skin, and in three hours blistered it, thus proving conclusively and satisfactorily that a change can be made advantageously as recommended.

2. Because the tincture prepared according to the present direction does not remain clear, but forms a deposit soon after being made.

Distinctive Tests for Cinchona Alkaloids. Dr. R. Godeffroy. (*Archiv Pharm.* [3], viii., 515–521.) The tests to be described are intended to enable druggists to distinguish between the sulphates of the cinchona alkaloids, which, as is well known, resemble each other very closely in appearance, taste, etc. The principle of the methods is to mix a drop of a saturated solution of the sulphate with a drop of a solution of potassium thiocyanate, and to observe the appearance under the microscope with a linear magnifying power of 110. To comprehend thoroughly the appearance of the crystals, reference to the cuts inserted in the original paper is necessary, but a description may prove of some service. Quinine sulphate shows small round globules like small starch granules, arranged in curved lines. When allowed to crystallize without addition of thiocyanate, quinine sulphate forms sheaf-like or fan-like bundles of needles. With thiocyanate cinchonine (quinidine) sulphate forms crystals resembling stags horns; and cinchonidine sulphate forms feathery crystals, arranged in stars or sheaf-like bundles.

A New Process for the Preparation of Phosphate Syrups. J. Laurie. (*Pharm. Journ.*, 3rd series, viii., 481.) In the following formula, the method adopted for the production of the ferrous phosphate is that proposed by Mr. Borland. (*Trans. Brit. Pharm. Conf.*, 1876, 593.) The author is not aware that the process employed by him for obtaining the calcic phosphate has before been applied to the manufacture of these syrups; he proposes it as an easy way of

obtaining a pure tricalcic phosphate, the varying composition of the commercial phosphates of lime being, in his opinion, a very frequent cause of the precipitates which have been found so troublesome; besides, the ordinary phosphate of lime, as is well known, always contains a large percentage of water, hence the finished syrup is frequently deficient in the lime constituent.

The strength adopted for Parrish's syrup, viz., half a grain ferrous phosphate and two grains calcic phosphate in the fluid dram, is the same as would result in making a syrup from Parrish's published formula, and agrees with the best commercial samples of syrup, as shown by Mr. Howie (*Pharm. Journ.*, 3rd series, vi., 808.)

A syrup of the full strength stated on the labels of "Parrish's Chemical Food," may easily be obtained by the process now described; but the large quantity of acid necessary to dissolve and retain the phosphates in solution renders the syrup disagreeably acid.

A saccharated solution of lime is prepared by shaking together during several hours,—

Freshly slaked Lime	8 ounces.
Refined Sugar, in powder	16 ounces.
Water	40 ounces.

The clear solution is estimated volumetrically for hydrate of lime, and will be found a little over four times the strength of the similar solution of the British Pharmacopœia.

Parrish's Chemical Food.

℞ Saccharated Sol. of Lime, sufficient to yield	670 grains of Hydrate of Lime.
Sulphate of Iron, pure	448 grains.
Phosphoric Acid, sp. gr. 1·75	3 fl. oz., or q. s.
Carbonate of Soda, crystallized	50 grains.
Carbonate of Potash	75 grains.
Cochineal, in fine powder	2 drams.
Orange Flower Water	1½ fluid ounces.
Refined Sugar, coarsely powdered	30 ounces.
Distilled Water	q. s.

Dilute the solution with distilled water to a pint, put into a quart bottle, gradually add the phosphoric acid, frequently shaking till the precipitate is dissolved, then carefully add the carbonates dissolved in one ounce of distilled water, shake till clear, then add the orange-flower water and enough distilled water to make the whole measure 32 fluid ounces; to 26 fluid ounces of the solution add the cochi-

neal, digest for several hours, and filter into the sugar; shake occasionally till dissolved.

Put the sulphate of iron with the rest of the phosphate solution into a bottle of about 7 fluid ounces capacity; cork tightly, shake occasionally for half an hour, squeeze strongly through moistened calico, and mix the clear liquor with the syrup; the product measures 48 fluid ounces.

It is necessary strictly to follow the direction of first dissolving the sugar in a portion of the phosphate of lime solution, and afterwards adding the ferrous phosphate; if an attempt be made to dissolve the sugar in the mixed lime and iron solutions, a precipitate of iron salt will certainly result.

Syrupus Ferri Phosphatis, B. P.

℞ Saccharated Sol. of Lime, sufficient to yield . . .	120 grains Hydrate of Lime.
Sulphate of Iron, pure	448 grains.
Phosphoric Acid, sp. gr. 1·75 .	10½ fluid drams.
Refined Sugar, coarsely powdered . .	17 ounces.
Distilled Water	q. s.

Dissolve the sugar in 8 fluid ounces of distilled water with the aid of heat; prepare a solution of ferrous phosphate as above directed (diluting the solution of phosphate of lime to 5 fluid ounces before adding the sulphate of iron); add this to the syrup, and enough distilled water to make the whole measure 24 fluid ounces.

This syrup will contain approximately the same quantity of acid as the Pharmacopœia syrup; but 6 fluid drams of acid, sp. gr. 1·75, will be found amply sufficient to dissolve and retain the iron, the formation of precipitates in these syrups not being retarded by a large excess of acid. A larger proportion of the carbonates of soda and potash added to "chemical food," will make the syrup less acid; or phosphate of soda may be substituted for the same purpose.

Syrups prepared according to the process just described will contain, as an impurity, a trace of sulphate of lime also; but the very small quantities present can hardly be considered an objection.

Samples of "chemical food," syr. ferri phosph., B. P., and syr. ferri phosph. c. strychnia, prepared as above, have been kept for six months without undergoing any visible change. All are entirely free from deposit. The chemical food has been kept in a Winchester quart bottle three-fourths filled, the other two in stoppered bottles, full, and exposed to strong light.

Syrupus Ferri Phosphatis c. Quinia et Strychnia (Easton's **Syrup**). G. Masson. (*Ibid.*, 482.) After reviewing the literature

of this preparation, and noticing the defects of the different formulæ proposed for its preparation, the author proposes the following, by which a colourless syrup may be readily obtained of full strength and good keeping qualities:—

℞	Strychniæ	24 grs.	
	Quiniæ Sulph.	860 ,,	
	Ferri Sulph.	4 ozs 40 ,,	Avoirdps.
	Sodæ Phosph.	12 oz.	
	Sacchari Purif. Contus.	60 ,,	
	Acid. Phosph. Dil.	48 ,,	

Dissolve the quiniæ sulph. in aq. dest., with a sufficiency of acid. sulph. dil., precipitate with liq. ammon. q. s., collect on a filter, wash carefully, avoiding the use of too much water, and add to the acid. phosph. dil. in which the strychnia has been previously dissolved. Dissolve the ferri sulph. in Oij., and the sodæ phosph. in Ov. of recently boiled distilled water; filter the iron solution if necessary to remove any oxidation; allow the solutions to cool to 130° F., and then add very gradually, with constant stirring, the solution of soda to the iron; allow the precipitate to subside, remove the supernatant fluid, and wash the ferrous phosphate by decantation with recently boiled distilled water; then transfer to a calico filter, express quickly the remaining liquid, and dissolve in the dilute phosphoric acid; finally add the sugar, dissolve without heat, and subsequently add a sufficiency of distilled water to make the product measure ninety-six fluid ounces, each fluid dram of which will contain one grain phosphate of iron, one grain phosphate of quinia, and $\frac{1}{32}$nd of a grain of strychnia.

Administration of Kousso. A. Corbe. (*Pharmaceut. Centralhalle*, 1877, No. 37.) The author considers the following emulsion as the most suitable form of administering the drug:—

℞	Florum Brayeræ anthelminthicæ pulveratorum	25·0
	Olei Ricini usque ad 100° C. calefacti	40·0
	In vas deturbatorium immissis et compressis affunde	
	Aquæ fervidæ	50·0
	Liquoribus delapsis exprime. Colaturas mixtas cum Vitello ovi unius	
	in emulsionem redige, tum admisce	
	Ætheris Guttas	40

Comparative Tests of some Anti-Ferments. R. V. Mattison. (*Amer. Journ. Pharm.*, 1877, 62.) On the 8th of November last, thirteen new bottles were taken, and in each of them was placed

100 c. c. of a strong infusion of malted barley, the following quantities of anti-ferments added, and the bottles placed at a constant temperature of 76° F. To bottle marked *A* nothing was added; to the others as follows:—

Schering's Salicylic Acid.	Benzoic Acid from Benzoin.	Calcium Bisulphite.
B . 3 centigrams.	*F* . 3 centigrams.	*J* . 3 centigrams.
C . 6 ,,	*G* . 6 ,,	*K* . 6 ,,
D . 9 ,,	*H* . 9 ,,	*L* . 9 ,,
E . 12 ,,	*I* . 12 ,,	*M* . 12 ,,

At the expiration of twenty-four hours these solutions were examined with the following result:—

A had fermented and tasted quite sour, but at this period no froth or "barm" was to be seen upon the surface of the liquid. The microscope showed the presence of *bacteria* in large numbers, and numerous very small cells of the *Saccharomyces Cerevisiæ*. *B*, *C*, *D*, *E*, *H*, *I*, and *M*, showed only bacteria in slightly varying quantity, but no cells could be observed, and there was no evidence of fermentative change; while in *F* there were numerous small cells observed, with bacteria present, and the liquid was slightly sour to the taste. *G* contained bacteria, was very slightly sour, and a few hyaline cells were observed. *J* was quite sour, had large numbers of bacteria and cells, the latter very small. *K*, *L* were very slightly sour, contained very few bacteria and very few minute cells.

No "barm" or froth was to be seen upon either of the solutions, and at the expiration of twenty-four hours they were again examined.

A large quantity of froth appeared by this time on the surfaces of *A*, *B*, *C*, *D*, *E*, *J*, *K*, *L*, *M;* they had each deposited a considerable precipitate, and were all decidedly sour and in active fermentation. The cells of the *Saccharomyces* were of large size and in countless numbers; these large cells were exceedingly prolific, giving off, by budding, myriads of smaller cells, many of which were arranged in chains like the beads of a necklace, and many of these smaller cells just escaping from the maternal cell, were observed to be throwing out their minute buds,—even before they had entirely separated from the parent cell. The form and appearance of the cells of these solutions, with one exception (*E*) were such as characterized those of *Saccharomyces Cerevisiæ;* while in *E* the cells more closely resembled those of *Saccharomyces Mycoderma*, as did the method of budding also. Still, it could scarcely be this plant, as the liquid

certainly was in the flood tide of active fermentation. No difference was observed in the appearance of the surface or the sedimentary ferments, excepting in the former the budding seemed more rapid. *F, G, H, I,* upon examination, proved to be all slightly sour; no appearance of froth, however, being seen. Under the microscope were to be seen a few fresh, plump cells, and a few larger withered cells, while these liquids had also grown muddy in appearance from the production of fresh cells.

At the expiration of twenty-four hours the solutions were again examined.

A, B, C, D, E, J, K, L, M were quite sour; they were covered with froth and rapidly proliferating cells, while bubbles of carbon dioxide could be seen to constantly rise to the surface of the liquid. In *J, K, L, M* the deep brown colour had been reduced to a yellowish white through the action of the disengaged sulphurous acid from the calcium bisulphite; *F, G, H, I* were scarcely changed. They were rather more sour than at the previous examination, and, although full of bacteria, there were very few cells to be seen, and those few were very small and shrivelled in appearance. Another marked difference between these four solutions containing the benzoic acid is in the fact that no froth is formed on these, while in the others the froth is from one-eighth to one-fourth the depth of the liquids.

In this series of experiments, therefore, the benzoic acid, while not entirely preventing fermentation, had a very much more marked influence in arresting and aborting this change than did either the calcium bisulphite, or the salicylic acid.

Preservation of Ergot. M. Mourrut. (*Répert. de Pharm.*, May 10, 1877.) The freshly powdered ergot is recommended to be mixed with 5 per cent. of powdered benzoin, whereby it will preserve its physical and medicinal properties without alteration.

Ergotine. P. Carles. (*Répertoire de Pharmacie*, No. 4.) A good preparation, identical with Bonjean's ergotine, may be prepared as follows:—1 kilogram of recently collected (best in July) ergot is dried in a moderately warm place during twenty-four hours, reduced to a moderately fine powder, moistened with one-third of its weight of water, allowed to macerate twelve hours, and then packed properly in a percolator, where it is exhausted by cold water. The exhaustion is judged of by the fact that the liquid runs off perfectly colourless. The percolate is evaporated on the water bath until it weighs 333 grams, or one-third of the original weight of the ergot. The sp. gr. of this extract will be about 1250 when cold.

Two litres of alcohol of 90 per cent., or six times the original weight of the ergot, are now added to the extract, and the whole well stirred and allowed to settle. A fresh addition of alcohol must cease to produce a cloudiness, otherwise more is to be added until this point is reached. After standing twenty-four hours, the clear liquid is removed, the residue washed with a little alcohol, which is added to the rest, the alcohol recovered by distillation on a water bath, and the residue evaporated to a proper consistence. It will weigh about 80 or 90 grams, which must be immediately placed into vessels, to be tightly closed.

The Preparations of Colchicum. Dr. F. Mols. (*Druggists' Advertiser*, Jan., 1878.) In the author's opinion the main cause of the unsatisfactory results of the use of colchicum in medical practice is twofold, and may be looked for partly in the unfitness of the raw material used in pharmaceutical laboratories, and on the other hand in the manner of its preparation, and this latter defect, again, caused by impractical formulæ in most of the pharmacopœias, as well as the thoughtless following of the same by the preparing pharmacists themselves.

The most effective constituent principle of *Colchicum autumnale* is, without doubt, found in the alkaloid—colchicine; and this is said without denying the effectiveness of the extractive substances which are soluble in water.

According to the assertions of the most prominent chemists of our time, it has been established that the seed of the colchicum, after it is over a year old, contains very little, if any, colchicine, and this is the case with the root or bulb after having been gathered a few months. The last editions of the "Pharmacopœia Borussica," as well as the "Pharmacopœia Germanica," permit only the use of colchicum seed which is not over a year old.

Now, it will be admitted by any practical pharmacist that the supply of several pounds of colchicum seed, which always has been taken from a wholesale house, is sufficient to make all preparations of colchicum for several years, even in a thriving business, and it may be safely stated that the colchicum bulb or seed, found in most of the drug stores, contains no colchicine at all. The other causes of the real ineffectiveness of these preparations are some of the formulæ of the pharmacopœias. According to the researches of the most prominent chemists of our time who have made the preparation of colchicine a specialty, such as Huebler, Aschaff, Bley, Pfeiffer, Maisch, Walz, Schoenbroodt, Burmeister, and Geiger, colchicine is extractible from the root or seed of colchicum *only by the*

medium of heated or acidiferous alcohol of 90 *per cent.*, while the pharmacopœias invariably dictate *diluted* alcohol, and in the case of vinous preparations prescribe it *more diluted* yet. By such method it is impossible to gain any colchicine, even if the natural raw material used really contained it.

In order to meet this dilemma, pains should be taken, first, to be in receipt every fall of a fresh consignment of colchicum seeds; and, secondly, to have a formula according to which a preparation may be made which contains all and every effective particle in the colchicum. This preparation is available alike to the physician and the druggist, because it is in the shape of a *fluid extract*, and therefore applicable to the preparation of the tincture as well as the wine

The manner of preparation is as follows:—

Colchicum seed, which has been gathered in July, is first dried then ground, and moistened with alcohol of 90 per cent. After twenty-four hours digest for further twenty-four hours on a steam bath with 90 per cent. alcohol, four times the weight of the seed used. (This procedure is best done in the still of a Wolff's or Mohr's steam distilling apparatus, whereby the over-distilled alcohol may be saved and returned into the still.) When cold, strain the contents of the alembic through linen, and distil off the liquid until there remains but one-half the weight of the seeds originally used, and place aside.

Macerate the strained seed again, but this time with hot distilled water, during twenty-four hours, pack it in a glass percolator, and exhaust with hot distilled water as long as the liquid retains a bitter taste; then evaporate by the steam bath until but half of the original weight of the seeds used remains. Then mix both extracts —the alcoholic with the aqueous—and keep the product four or five days in narrow vessels (for which tall, narrow glass bottles are best adapted). The dark green oil (*Oleum Colchici seminis pingue*), which was dissolved in the alcohol will have accumulated on the top, and is to be removed by decantation.

For this fat green oil there has not been found any use as yet. One troy ounce of this fluid extract represents one troy ounce of colchicum seed.

The author is convinced of the presence of colchicine in an extract prepared as above, as he gained 15 grains of colchicine from a pound of extract; while even the greatest possible accuracy in analysis could not detect the least trace of colchicine in five samples of extract procured from several large establishments of so-called respectable manufacturing chemists.

Preparation of Pure Scammony Resin. E. Perret. (*Journ. de Pharm. et de Chim.*, Feb., 1878, 120.) This resin may be obtained in a perfectly pure state by exhausting the crude pulverized scammony with boiling alcohol, neutralizing the dark alkaline solution with a few drops of sulphuric acid, and filtering to remove the colouring matters thus precipitated. The filtrate is evaporated in a retort, the residue dried on a sand bath at about 104° C., and while still warm poured upon a marble slab. After cooling, the resin is reduced to a powder, the purity of which may be judged from its whiteness.

Syrup of Iodide of Iron. J. E. Gregory. (*New Remedies*, 1878, 110.) The difficulty encountered in preparing and preserving syrup of iodide of iron may be easily overcome by substituting glycerin for syrup. It is unnecessary to heat the glycerin when the iodide of iron is added. This shortens the process very materially, and simplifies it very much. The product is very stable, and retains its colour for a long time. A specimen has stood in a common flint-glass bottle in an ordinary lighted room for four months without showing any signs of decomposition.

Castor Oil Soaps. M. Giffard. (*Pharm. Journ.*, 3rd series, viii., 691.) About seven years since, Mr. Rimmington called attention to the value of castor oil in the preparation of a pure medicinal soap (*Pharm. Journ.*, 3rd series, i., 682.) The subject has now been carried further by the author in a paper contributed to the *Bulletin de Travaux de la Société de Pharmacie de Maine-et-Loire*, on the saponification of castor oil and its therapeutic applications.

Castor oil, by saponification, yields three fat acids, namely, margaric, ricinic, and ricinolic acids. Margaric and ricinic acids are present only in small proportions, but ricinolic acid is much more abundant, so that the compounds with bases may be considered to be practically true ricinolates. As a general character, they are unctuous to the touch, and the author considers that this property might be frequently utilized in perfumery and soap making.

The ricinolates of potash and soda are obtained very readily, being produced by simple contact of the oil with strong lye. The potash soap is soft, and resembles glycerole of starch. The soda soap is opaque white, and possesses the characteristic unctuosity in a marked degree. It could be substituted for ordinary soap as an excipient in purgative pills, especially those of aloes. When triturated in a mortar it softens and can be readily incorporated with powders, forming a mass of good consistence.

To prepare this soap, the author mixes 250 parts of castor oil with

100 parts of soapmaker's ley. After a few days, before the soap becomes too hard, it is kneaded with the hands in a saturated solution of chloride of sodium, and is then allowed to dry.

The ricinolate of magnesia is not obtained directly, but is prepared by double decomposition, by pouring a neutral solution of an alkaline ricinolate into a solution of sulphate of magnesia. The white curdy precipitate that forms is washed several times on a filter or a cloth. This ricinolate melts at 50° C.; it is insoluble in water, but soluble in alcohol, ether, and chloroform. From the alcoholic and ethereal solutions, when allowed to evaporate slowly, it is deposited in silky crystalline needles. The author has experimented upon the internal administration of the ricinolate of magnesia, and finds that it preserves the properties of its two components. It acts as a gentle laxative, which might be useful in constipation. As its soft consistence does not allow of its being made into pills without some addition, he uses powdered rhubarb or magnesia. It then forms a moderate purgative, which does not produce colic or the least intestinal irritation.

The ricinolate of lime presents no points of interest.

The ricinolate of iron obtained by double decomposition is soluble in ether. The author suggests that if employed in the same proportions as other iron preparations, the constipation which ordinarily attends their use might be avoided.

The lead soap is obtained by direct combination, like ordinary lead plaster. It hardens much less quickly, and might therefore be used in the preparation of adhesive plasters.

The ricinolate of mercury is formed as a white precipitate, of rather firm consistence, upon mixing a solution of a mercuric salt with a solution of an alkaline ricinolate.

The author also prepared a number of other ricinolates, but none of them present points of pharmaceutical interest.

The Dispensing of Monobromated Camphor. M. Lepage. (*Journ. de Pharm.* [4], xxv., 533.) The author takes advantage of the solubility of this substance in fixed oils. He gently heats the monobromated camphor with six times its weight of oil of almonds until complete solution is effected, and emulsifies the solution with gum arabic in the usual manner. The emulsion may then be mixed with water and syrup in any proportion. For one gram of monobromated camphor dissolved in six grams of the oil, he uses three grams of gum arabic suspended in twice its weight of water. The emulsions thus obtained are as perfect as those made of oil of almonds alone.

The Preparation of Dialysed Iron. E. B. Shuttleworth.

(*Canadian Pharm. Journ.*, Oct., 1877.) The author describes two methods, each of which has its peculiar advantages. The second is the more expeditious one, and in his opinion the best.

The first consists in adding ammonia to a solution of perchloride of iron, so long as the precipitate formed is redissolved. A solution is produced which contains ferric hydrate dissolved in ferric chloride, with free chloride of ammonium. Either *Liq. Ferri Perchlor. Fort.*, B. P., or the *Liq. Ferri Chloridi*, U.S.P., may be conveniently used, and the liq. ammoniæ, sp. gr. ·959 or ·960, of either pharmacopœia, will be found a convenient strength. It will be remembered that this is made by adding to the strong ammonia of commerce about twice its bulk of distilled water. If the ammonia be added to the stronger solution of iron, considerable heat is evolved, and on cooling the preparation becomes gelatinized—often so much so that the vessel containing it may be inverted. It is better to avoid this result, and to this end the solution of perchloride must be diluted until of a specific gravity of about 1·300. This degree may be nearly enough approached by diluting two measures of the B. P. liquor with one of water, or adding one measure of water to five of the U. S. P. preparation. This solution will generally remain permanently bright and fluid. The amount of liq. ammon. required will of course vary much with the acidity of the perchloride. The liquor ferri, B. P. will sometimes bear as much as an equal volume. A gelatinized solution, even when made from the undiluted liquor, will often become fluid when put upon the dialyser ; but, as the author said before, it is better to work with bright solutions.

The second method consists in adding to either solution of the perchloride a quantity of recently precipitated ferri hydrate. Mix any given quantity of the liq. ferri with about five times its bulk of water, and add excess of liq. ammon., also diluted with water. A more soluble hydrate is produced when the iron is added to the ammonia, as remarked in the case of the hydrate precipitated from the persulphate ; but, in order to proceed in this way, it is necessary to know approximately the amount of ammonia required. The precipitate should be washed well, by decantation, with several waters, and then thrown upon a filter to drain for a short time. It may then be dissolved, by the aid of a gentle heat, in as much liq. ferri as may be required for solution. The exact quantity cannot be stated, but in no case will it exceed the volume of the liquor precipitated, and sometimes only one-fourth of this amount will be necessary. The solution is ready for dialysis.

With the majority of pharmacists, the dialyser will have to be extemporized out of such materials as may be at hand. The hoop may be a bell jar, an inverted glass funnel, or, what is even simpler and handier, made from one of the flat hoops of an ordinary flour barrel. This may be smoothed a little with a knife or sand paper, and made to the required diameter. Ten or twelve inches is a convenient size, if much larger the dialytic septum is liable to belly at the centre, and thus make the layer of liquid too deep at that point.

Parchment paper is generally used for forming the septum. This is not the paper which stationers in this country generally supply under this name, but a paper made less pervious, and strengthened by being dipped in sulphuric acid. Some of the strong and well-sized papers, as those used for legal documents, may be made to answer. It is absolutely necessary that there be no holes in the septum; and to ascertain this it is best to sponge with water the upper side of the paper, and then carefully examine the under side. If any drops appear, the paper should be marked, and a little white of an egg may be applied and coagulated by heat, or a drop of collodion or shellac varnish may be put upon the spot. Bladder, previously washed, may be used, and will be found to work well, especially if divested of its outer coat.

The septum should be two or three inches larger than the hoop, and should be secured round it with twine not bound tightly, and the edge should be allowed to stand up around the hoop so that if any liquid escapes through the joint or hoop it will be retained by the paper. The dialyser will now resemble a drum or sieve, and into this the liquor to be dialysed is poured to a depth of, at most, half an inch. It is then floated on the surface of some distilled water contained in a suitable vessel. If the hoop be of some heavy material it must be supported, so that the septum is barely below the level of the water.

The time required for dialysing either of the solutions whose preparation has been described will vary with the nature of the septum, its extent of surface, the depth of the liquid, the frequency of changing the water beneath, temperature, and other conditions which need not be enumerated. If everything works well, and the water changed daily, the process will be finished in one or two weeks. Distilled water is always preferable, and indeed necessary, especially for the first two or three days. Clear rain water is the best substitute. The process may be said to be complete when the water no longer shows traces of chlorides, and the preparation becomes nearly tasteless, or at least not ferruginous.

A pig's bladder, completely filled with iron solution, securely tied, and immersed in water frequently changed, answers well for making this preparation. The process requires a longer time than with a carefully regulated and properly conducted dialysis, but it entails considerably less trouble. When the author first tried this plan, he was not aware that Prof. Dragendorff, of Russia, had, some five years ago, suggested its application to dialysed iron ; but he corroborates all which that gentleman says. It is an advantage to procure the bladder perfectly fresh, as it is then easily cleaned by pure water, and alkaline ley need not be used. Great care is necessary in tying the neck carefully. This can be best accomplished by a few turns of iron wire. Above this may be secured a piece of twine to suspend the bladder by means of a stick or rod placed on the edge of the vessel containing the water. The bladder should be perfectly full, and immersed altogether in water. The attraction of the solution for water is so great that considerable pressure is manifested, and should any weak parts or holes be in the bladder the liquid will be forced out, water will take its place, and failure result.

The standard of strength which appears to have been generally adopted is 5 per cent. In order to test this preparation, one hundred grains of the liquor should be placed in a tared capsule, and evaporated to dryness. The residue should weigh about five grains ; if more, distilled water must be added in the calculated proportion ; if less, the solution may be placed in a warm and dry place until reduced to the proper volume. If much heat is employed, and often, in any case, the oxychloride of iron will be deposited as normal oxide, and the preparation will be spoiled. The evaporation of the solution may, as a rule, be considered a very unsatisfactory process, and every care should be taken to render it unnecessary.

Note on the Specific Gravity and Strength of Dialysed Iron. E. B. Shuttleworth. (*Canadian Pharm. Journ.*, Dec., 1877.) The following table shows the percentage weights obtained from several strengths of a solution which had been dialysed for twenty-four days, and which did not blacken infusion of galls :—

Specific Gravity.	Pulverulent on Water bath.	Well dried on Water bath.	Calcined.
1·046	—	5·6	5·0
1·040	5·5	5·0	—
1·038	5·2	4·7	4·3
1·034	5·0	4·3	—

It will thus be seen that three of the above solutions might be described in common language as containing 5 per cent. of oxide, though only the first is properly of that strength.

Taking into account the liability of strong and well dialysed solutions to become gelatinous, the author thinks a liquor of 1·040, yielding, when evaporated and well dried over a water bath, 5 per cent. of residue, best fitted for medical use. Such a solution keeps well; it can be readily estimated by the pharmacist—a simple evaporating dish being all that is required—and, moreover, the strength corresponds as nearly as possible with that of the ordinary tincture of perchloride of iron. In estimating the strength by evaporation, the residue left in the dish should be heated until it ceases to lose weight; and this being done it should be cooled and its weight noted, without loss of time, as it rapidly absorbs moisture on exposure to the air.

Provided that the solution is free from ferruginous taste, that it is not distinctly *blackened* by infusion or tincture of galls, and does not give direct evidence of containing hydrochloric acid, the specific gravity is a fairly reliable test.

Some Analyses of Dialysed Iron. H. Trimble. (*Amer. Journ. Pharm.*, 1878, 60.) The author has analysed six commercial specimens of dialysed iron, with the following results:—

	Per cent. of Fe_2O_3.	Per cent. of Cl.	Per cent. of the Salt.	Formula.
I.	3·143	·140	3·192	$29\,Fe_2O_3.\,Fe_2Cl_6$
II.	3·442	·154	3·497	$29\,Fe_2O_3.\,Fe_2Cl_6$
III.	2·394	·156	2·514	$19\,Fe_2O_3.\,Fe_2Cl_6$
IV.	2·583	·286	2·804	$11\,Fe_2O_3.\,Fe_2Cl_6$
V.	4·677	·198	4·831	$31\,Fe_2O_3.\,Fe_2Cl_6$
VI.	2·874	·235	3·058	$16\,Fe_2O_3.\,Fe_2Cl_6$

All these have been represented to contain 5 per cent. of the oxychloride.

Peroxychloride of Iron, Dialysed Iron, and Catalytic Iron. E. Scheffer. (*Amer. Journ. Pharm.*, 1878, 97.) The different views regarding the composition of dialysed iron, of whose preparation a great deal has been written for the last twelve months, induced the author to make a series of experiments, the result of which throw much new light on the subject, and also show the relation of peroxychloride of iron, dialysed iron, and catalytic iron.

By precipitating a solution of ferric chloride with ammonia, the precipitate differs according to the quantity of ammonia used as

precipitant. Ammonia added as long as a precipitate is formed yields an oxychloride, and the liquid above the precipitate has *acid* reaction. Ammonia added carefully until the supernatant liquid has become perfectly *neutral* produces a more basic oxychloride. Ammonia added to *excess* yields a precipitate free from chlorine, but containing ammonia. Of these three precipitates, the first two are soluble in water, the third is insoluble.

In the following experiments 300 c.c. of the officinal ferric chloride solution were diluted with water to 1500 c.c., and 150 c.c. of this dilute solution were taken for each experiment. The ammonia was also diluted with water, but sp. gr. was not taken, as it was not deemed necessary.

1. To 150 c.c. of the dilute ferric chloride solution dilute ammonia was added, in small quantities at a time, to saturation; that is, to the point at which a further addition of ammonia produced a permanent precipitate. To effect this 81·3 c.c. of ammonia were required; the smallest quantity of ammonia added now produces a copious precipitate, and on an addition of 1·7 c.c. more, or about two per cent. of the quantity needed for saturation, all iron was precipitated, while the clear, colourless liquid above the precipitate showed acid reaction.

2. The same experiment was repeated, but to the mixture obtained after the addition of respectively 81·3 and 1·7 c.c. of ammonia, ammonia was added to perfect neutralization of the supernatant liquid, 6 c.c. being required, making the total of ammonia 89 c.c. Although the liquid is perfectly neutral, the precipitate is not pure ferric oxide, but contains still a considerable quantity of chlorine.

The precipitate of 1, washed several times by decantation, until on addition of fresh water it settles slowly and remains suspended for a long time, is then collected on a filter, and, after thorough draining, washed carefully with small quantities of water at a time. The liquid passes through very slow, and assumes, after time, a yellowish colour, which becomes deeper yellow by continued washing; the precipitate on the filter changes thereby its appearance, shrinks considerably, and obtains at last a darker brown, almost black, colour, and has the consistence of a jelly. When all the precipitate is converted into a black jelly, which in thin layers is transparent and of a deep garnet red colour, the wash water no longer passes through the filter unless a very large quantity is above the precipitate, when it may happen that it dissolves at once forming a black-red liquid. If the jelly is taken from the filter, a small quantity of water added to it is sufficient to dissolve it

entirely after some time. The solution has, in reflected light, a pure black colour, dissolves in more water to a transparent deep red solution, is neutral, but still contains ammonium chloride, as the jelly forms before it is all washed out.

A second precipitate, obtained in the same way, was, after draining off the supernatant acid liquid, subjected to dialysis. In the same degree as the acid and ammonium chloride is removed, the precipitate in the dialyser changes at first into a jelly-like black mass, and afterwards into a turbid thick liquid of the consistence of cream. Taken then (after three weeks) from the dialyser, it dissolves on the addition of a little water, after a few days, to a perfectly clear thin liquid, of a brownish black colour.

By using more ammonia than is necessary to precipitate the iron, precipitates are obtained which are also soluble in water, provided that ammonia was not added in excess. The more ammonia is used the more basic the precipitates will be: these have the advantage that the ammonium chloride can be more perfectly removed by washing before the precipitates begin to dissolve, which is evidenced by the yellow colour of the filtrate, so that they may be washed until the filtrate becomes merely opalescent on the addition of silver nitrate, or keeps perfectly clear. It is of the greatest importance that these more basic precipitates be as free as possible from ammonium chloride, since a small quantity prevents their solution. (It is the presence of ammonium chloride, also, that causes the gelatinization of solutions of the less basic oxychlorides.)

These more basic precipitates do not form a jelly after being thoroughly washed, but finally form a thick, blackish, syrupy liquid, which when taken from the filter gives, on addition of a little water, a very turbid mixture, and, on standing several days, a thin clear liquid, of a brownish black colour; or they only change their colour by washing to a somewhat darker but not black hue, without losing much of their bulkiness. This is the case with the precipitates that were removed from a neutral supernatant liquid. After they are washed until the filtrate remains clear on addition of silver nitrate, the precipitates are taken from the filter and transferred with a little water into bottles, so that they can be shaken from time to time. The colour of the mixture is then reddish yellow or reddish brown, but darkens from day to day, as the precipitate enters solution. In the course of several weeks a clear thin liquid, of brown colour, is obtained. A temperature of 80° to 85° F. accelerates the solution of the precipitates, while a much higher temperature prevents it.

A few experiments were made by adding to the precipitates, in perfectly neutral liquids, respectively one-half and one per cent. of the ferric solution. Under frequent stirring the mixture was allowed to stand for two days, after which the washing was commenced, and concluded finally on a filter, as above mentioned.

The author gives below the results of the analyses of different preparations obtained by the above-explained methods, the analyses being made as follows :—

The solutions were thoroughly mixed with an excess of pure sodium carbonate, and evaporated to dryness. After dissolving the excess of sodium carbonate and the sodium chloride in water, the filtrate was acidulated with nitric acid, and the amount of chlorine determined with a tenth normal solution of nitrate of silver; the ferric oxide was calcined and weighed.

1. Solution of precipitate obtained with 81·3 + 1·7 c.c ammonia—·490 Fe_2O_3 + ·061 Cl = ·441 Fe_2O_3 + ·0953 Fe_2Cl_3 = 82·6 per cent. Fe_2O_3 + 17·4 per cent. Fe_2Cl_3.

2. Solution of precipitate obtained with 81·3 + three times 1·7 c.c. ammonia—·365 Fe_2O_3 + ·0248 Cl = ·346 Fe_2O_3 + ·0385 Fe_2Cl_3 = 90 per cent. Fe_2O_3 + 10 per cent. Fe_2Cl_3.

3. Solution of precipitate obtained with 81·3 + four times 1·7 c.c. ammonia—·614 Fe_2O_3 + ·0382 Cl = ·5853 Fe_2O_3 + ·0583 Fe_2Cl_3 = 91 per cent. Fe_2O_3 + 9 per cent. Fe_2Cl_3.

4. Solution of precipitate obtained with 81·3 + 4·5 times 1·7 c.c. ammonia—·411 Fe_2O_3 + ·0223 Cl = ·3942 Fe_2O_3 + ·034 Fe_2Cl_3 = 92 per cent. Fe_2O_3 + 8 per cent. Fe_2Cl_3.

5. Solution of precipitate obtained by adding 1 per cent. of ferric chloride solution to the precipitate caused by 89. c.c. ammonia—·455 Fe_2O_3 + ·0308 Cl = ·4318 Fe_2O_3 + ·047 Fe_2Cl_3 = 90·2 per cent. Fe_2O_3 + 9·8 per cent. Fe_2Cl_3.

6. A precipitate formed by adding to 150 c.c. of the ferric chloride solution 91·5 c.c. of ammonia, and washed until the filtrate remained perfectly clear on addition of silver nitrate, gave on analysis—·416 Fe_2O_3 + ·00602 Cl = ·4115 Fe_2O_3 + ·00917 Fe_2Cl_3 = 97·83 per cent. Fe_2O_3 + 2·17 per cent. Fe_2Cl_3.

This precipitate was transferred to a bottle, with a little water, and shaken occasionally. At the date of this paper it has stood a little over seven weeks, during which time over three-fourths of the original precipitate has dissolved. The writer is fully convinced, to judge from its appearance, that it will ultimately dissolve entirely.

7. Another precipitate, obtained with a little more ammonia than 6, gave—·424 Fe_2O_3 and ·00318 Cl.

This precipitate has, at the date of this paper, not shown the least sign of ever dissolving, although it has stood as long and been shaken as often as 6.

For comparison, the author has examined several *commercial* preparations of *dialysed iron*:—

I. ·604 Fe_2O_3 + ·0371 Cl = ·576 Fe_2O_3 + ·057 Fe_2Cl_3 = 91 per cent. Fe_2O_3 + 9 per cent. Fe_2Cl_3.

II. ·255 Fe_2O_3 + ·01275 Cl = ·2454 Fe_2O_3 + ·01947 Fe_2Cl_3 = 92·6 per cent. Fe_2O_3 + 7·4 per cent. Fe_2Cl_3.

III. ·534 Fe_2O_3 + ·0203 Cl = ·5187 Fe_2O_3 + ·031 Fe_2Cl_3 = 94·47 per cent. Fe_2O_3 + 5·53 per cent. Fe_2Cl_3.

IV. ·274 Fe_2O_3 + ·0125 Cl = ·2646 Fe_2O_3 + ·0191 Fe_2Cl_3 = 93·3 per cent. Fe_2O_3 + 6·7 per cent. Fe_2Cl_3.

Dr. Hager's *Liquor ferri peroxychlorati*, which he prepares by dissolving the ferric hydrate obtained from 115 parts of ferric chloride solution in ten parts of the same ferric chloride solution, contains, when all the ferric hydrate is dissolved, 85 per cent. Fe_2O_3 and 15 per cent. Fe_2Cl_3. No doubt a more basic preparation could be realized by Dr. Hager's method, that is, by dissolving ferric hydrate in ferric chloride solution, if the ferric hydrate were perfectly pure. But, as his ferric hydrate always contains ammonia, which cannot be removed by washing, this ammonia forms, when the precipitate is added to the ferric chloride solution, ammonium chloride, which sets a limit to the solution of ferric oxide. The basicity of this preparation stands in inverse ratio to the quantity of ammonium chloride in it.

Dr. Wagner, the originator of dialysed iron, does not communicate the method for making his later preparation, the *catalytic iron*, but asserts that it is not made by dialysis, and that it takes three months to make it. To judge by this, the supposition might not be far from wrong, that it is a solution of a basic oxychloride precipitate, obtained as above explained. The author could not obtain any of Dr. Wagner's catalytic iron, and therefore cannot say how much chlorine it contains in proportion to the ferric oxide: that it does contain chlorine Dr. Hager has fully proven.

The above experiments teach us that the preparation of a perfectly pure ferric hydrate is very difficult, almost impossible, as in one case it is apt to contain chlorine, in the other ammonia. They prove that the precipitate of oxychloride of iron is soluble in pure water, and that in its more basic combinations it is only soluble when free from saline compounds.

They likewise prove that a solution of very basic oxychloride can

be prepared without dialysis, and that the product may be made to contain a less per cent. of chlorine than that found in the best commercial sample of dialysed iron examined by the author.

By referring to the precipitate of experiment 7, it becomes evident that the solvent power of ferric chloride on ferric hydrate has a limit. This indicates at the same time that a pure ferric hydrate will not dissolve, and that in all the different iron solutions, whether they be called peroxychloride, dialytic, or catalytic, the ferric oxide is kept in solution by ferric chloride. As the proportion of these two ferric compounds can be changed at will, a chemical combination of them cannot be well thought of.

The Preparation of Suppositories containing Extracts. P. Petit. (*Journ. de Pharm. d'Anvers*, 1877, 300.) The author proposes to facilitate the admixture of extracts with cacao butter in the preparation of suppositories by the addition of a substance soluble in water as well as in fats, and recommends soap for this purpose. The extract is liquefied in a porcelain capsule, with a small quantity of water, and animal soap equal in quantity to the extract is added; the solution is evaporated at a moderate heat to a syrupy consistence, and fused together with the requisite quantity of cacao butter; the mixture is well agitated until it commences to solidify, when it is poured into well-cooled moulds. With a little practice and care, the suppositories prepared in this manner are quite uniform in colour, and perfectly homogeneous, so that no unmixed particles of extract can be discerned in them.

Emulsions. P. H. Dilg. (*Amer. Journ. Pharm.*, 1878, 326.) In preparing emulsions, German apothecaries generally employ the relative quantity of gum and oil officinal in the German Pharmacopœia; many differ, however, in regard to the exact proportion and time of adding the first portion of water. Some mix at once four parts of water, four of oil, and two of gum, others first mix four parts of oil with two parts of gum, and then add four parts of water at once; still others follow either of the above methods, with the exception of using only three instead of four parts of water as the first portion. The author has experimented with each one, and came to the conclusion that, though there is no material difference in the result, the second is the most advantageous mode. It is preferable to the first for being less liable to afford the gum—especially when in fine powder—opportunity to clog, and it is more easily manipulated than the third method, since the larger amount of water facilitates the division or spread of each particle of gum, thereby expediting the thorough combination of the mixture. After

mixing intimately half as much gum as a given quantity of oil or balsam, add at once the same quantity of water as oil, and triturate until a crackling noise is produced, which indicates that the oil is thoroughly emulsionized and will bear any amount of dilution; it is one of the principal points to be observed in following the German process. As far as permanency and pure milkiness are concerned, there is probably no superior emulsion made; it has, however, the decided disadvantage of requiring too much gum. Therefore, whenever a larger amount of oil is required to be emulsionized, it is advisable to use the method which has found much favour at least among Philadelphia druggists, namely, forming a mucilage and adding oil gradually, with much less gum than is generally used. The author succeeded in making perfect emulsions, which will remain without separating for about a week, when they will commence to separate into layers without liberating the oil, so that a slight shake will re-combine them. He makes a mucilage with f ʒiv. water and ʒj. gum, and gradually (not necessarily slowly) adds f ʒj. oil; after these are well combined, enough water is added to make f ʒij., after which the mixture will bear copious dilution. It is a mistake to think that the mixture must be *thick*, as this renders it necessary to add the oil and balance of water *alternately*. In trying to make the same emulsion, using only f ʒij. water to begin with, it became granulated, and required additional water to spread the gum sufficiently, so as to combine smoothly with all the particles of oil. Emulsions of cod liver oil, copaiba, castor oil, and oil of turpentine were made by this method with very satisfactory success.

Rapid Preparation of Mercurial Ointment. J. Giraud. (From (*Journ. de Pharm. et de Chime.*) The improvement suggested by the author, which is said to accelerate the process considerably, consists in the hardening of the lard with a certain proportion of vegetable wax before the mercury is added, and the subsequent softening of the ointment with olive oil. 250 parts of lard are melted with 120 parts of vegetable wax, and 690 parts of mercury are added while the mixture is still hot. After the metal is extinguished, 200 parts of olive oil are added.

The Application of Potassium Permanganate as an Approximate Quantitative Test in Pharmacy. J. Barker Smith. (*Chem. and Drugg.*, 1877.) Potassium permanganate may be advantageously applied in the assay of numerous articles of the materia medica, and affords a handy method of estimating minute quantities of various important substances which could formerly be estimated only by comparatively tedious processes. The author uses a solution con-

taining one decigram of the permanganate per litre, and gives the weights of a variety of substances which discharge the colour of 50 c.c. of this solution. This effect is produced with ·0025 gram of tannin, ·004 gram of morphine, ·019 gram of quinine, ·007 gram of carmine, etc. The original articles contain a tabular representation of the author's results, and must be referred to for details.

Thymol as an Antiseptic and Antifermentative. Dr. L. Lewin. (*New Remedies*, 1877, 362, *from Virchows Archiv.*) The author has found that the addition of one-tenth of one per cent. of thymol is capable of arresting saccharine and lactic fermentation, which would place this substance even higher in rank than carbolic or salicylic acids. It suppresses every kind of fermentation or putrefaction. He recommends it chiefly for the antiseptic treatment of wounds, also as a remedy for stomachic fermentation and dilatation, and in diseases depending upon the action of living organic germs, such as diphtheria. It also arrests excessive secretion by mucous membranes. For internal administration it may be given in solution in water (0·5 gram of acid in 1000, afterwards of double the strength, 1·0 gram in 1000), two, three, or more tablespoonfuls in a day. For external use the saturated aqueous solution (1 in 1000) is generally sufficient; but for washing out offensive wounds it should be employed in a stronger, alcoholic, solution.

Thymol and its Pharmacy. A. W. Gerrard. (*Pharm. Journ.*, 3rd series, viii., 645.) Thymol is produced from several labiatæ, principally from *Thymus vulgaris*, *Monarda punctata*, *and Ptychotis ajowan*. It is in nearly transparent and colourless irregular crystals, sp. gr. 1·028, of a burning and aromatic taste. It fuses at about 44° C., and often remains liquid for several days or until brought in contact with a crystal. It is freely soluble in alcohol, ether, chloroform, benzol, carbon bisulphide, oils, and in potassa and soda; it dissolves sparingly in water, glycerin, and ammonia; ether, shaken with the alkaline solutions, removes the thymol entirely.

The author finds that the strongest aqueous solution of thymol available is 1 in 1000. 4 grains of it dissolved in a fluid ounce of rectified spirit will yield an alcoholic solution miscible with water without becoming turbid. 1 grain dissolved in 2 fluid drams of heated glycerin remains clear on cooling, the solution becoming turbid on the addition of water until four volumes of the latter have been added, when it is clear again. 1 grain of caustic soda dissolves 3 grains of thymol, and 1 grain of potassa $2\frac{1}{3}$ grains of it; the solutions remain clear when diluted with water. Fats and oils are excellent solvents of thymol, but require to be heated to insure

perfect solution. Vaseline is not an eligible basis for it, the thymol crystallizing upon the surface of the mixture.

The author's attempts to prepare thymol from commercial oil of thyme failed completely. The oil instead of containing 50 per cent. of thymol, as some authorities assert, proved to contain none at all, and to consist of cymene and thymene only. He infers from his results that the thymol is extracted from the oil of thyme in the countries of its production, and before the oil is sent into the markets.

Ointment of Thymol. B. Squire. (*Pharm. Journ.*, 3rd series, viii., 603.) Finding that the solid crystals of thymol melt at the temperature of a water bath, and that the liquid thymol is miscible in all proportions with melted lard, the author recommends the following formula:—

℞	Thymol	ʒj.
	Adipis	℥j.

Melt together on a water bath, stir well, and allow to cool.

This is suggested as a suitable form of applying thymol as a remedy for ringworm.

Thymolated Adhesive Plaister. B. Squire. (*Ibid.*, 766.) The author recommends the addition of thymol to adhesive plaister in the proportion of 1 part to 1000, to render it more antiseptic and less irritating.

Pharmaceutical Preparations of Thymol. Dr. R. Crocker. (*Ibid.*, 666.) The author uses thymol with success in psoriasis and other skin diseases. He gives the following formulæ for galenical preparations of this substance:—

For ointment, one to thirty grains of thymol to an ounce of vaseline; for a lotion, five grains of thymol, rectified spirit and glycerin, of each an ounce, water sufficient for eight ounces; also a solution of from five to eighty grains of thymolate of potassium to eight ounces of water. It may be interesting to dispensers to know that when the ointment is carelessly made, so that minute crystals are present in the ointment, these crystals will act as a caustic, and produce minute holes in the skin. On this account it is necessary to dissolve the thymol by rubbing it down with a little alcohol before mixing it with the vaseline.

Incompatibility of Strychnine with Bromide of Potassium and certain other Salts. A. B. Lyons. (*Canadian Pharm. Journ.*, April, 1878.) The author's attention was called to this subject by a case of serious poisoning by the last dose in a bottle prepared after the following prescription:—

℞	Strychnine	grs. ij.
	Bromide of Potassium	ʒ ij.
	Syrup,	
	Water, āā	ʒ iv.

M.

This prescription when first prepared, *secundem artem*, forms a clear mixture, which, however, in a short time becomes turbid and eventually deposits a considerable portion of strychnia. Hence, if the mixture were not well shaken whenever used, the last dose might well be a dangerous one. Bromide of sodium, iodide of potassium, and even chloride of sodium, cause a separation of strychnine from its solutions. Even so small a quantity of common salt as 10 per cent. produced a decided precipitation in a solution of strychnine containing one grain to the ounce.

Nitrate of potassium and sulphate of sodium seemed to have no effect when dissolved to saturation in strychnine solutions of this strength.

Hence it follows that strychnine should never be prescribed in solution in combination with any considerable quantity of iodide, bromide, or chloride. If such a combination is prescribed, the patient should be directed always to shake the vial well before taking a dose of the mixture.

The Preparation and Preservation of Pepsine. M. Andouard. (*L'Union Pharm.* From *Chem. and Drugg.*, Nov., 1877.) After several years' work, the author's experiments (not yet concluded) have led him to adopt the following process:—The stomach is washed with water, the pepsine precipitated by sodium chloride, and this salt is removed by dialysis. The solution of pepsine is then mixed with its own weight of pure glycerin. It is not indispensable to remove all traces of the sodium chloride, as this salt interferes neither with the digestive nor with the keeping properties of the pepsine.

Thus prepared the pepsine is exceedingly active, and almost unalterable. It coagulates milk very readily, and digests much larger quantities of fibrine than indicated by the Codex. This digestion, rapid even at 70° F., takes but a very short time at 100° F.

Some solution of pepsine in diluted glycerin has been preserved in a partly filled bottle for more than two years. Although prepared under defective conditions it is still limpid, and neither colour nor odour show any change.

Extractum Ergotæ Liquidum for Hypodermic Injections. M. Yvon. (*Journal de Pharmacie et de Chimie.* From *Chem. and*

Drugg., Nov., 1877.) Coarsely powdered ergot is treated with carbon bisulphide to remove the fixed oil. It is then exposed to the light and air until all odour of the solvent has disappeared. It is then to be percolated by cold distilled water containing 4 per mille of tartaric acid. The solution is boiled to precipitate albuminous matters, and reduced in a water bath to one-third its volume. It is to be cooled and filtered, then digested with a slight excess of calcium carbonate to remove excess of tartaric acid, filter, evaporate to a syrupy consistence, and precipitate it by means of 90° alcohol. After a second filtration, it is to be decolorized with washed animal charcoal, filtered, and the alcohol driven off. Distilled water is to be added, and 15 grains of salicylic acid for every 100 grains of ergot used. It is then to be diluted so that its weight is equal to the ergot employed. It is left for a few days to deposit, and is then bottled in small vials. It is said that this preparation thoroughly represents its own weight of the drug.

Tincture of Kino. P. P. Fox. To prevent the gelatinization of this tincture, the author proposes in the *Bulletin de la Société royale, de Pharmacie de Bruxelles*, to make it with a mixture of 4 parts of alcohol, 1 part of water, and 1 part of glycerin instead of spirit.

NOTES AND FORMULÆ.

PART IV.

NOTES AND FORMULÆ.

Quinetum. Dr. H. J. Vinkhuysen. (*New Remedies*, 1878, 144.) The author records his experience with the collective alkaloid from Peruvian bark, called quinetum. He has used it in one hundred cases, and formulates his conclusions as follows :—

1. The only malarious disease in which quinetum cannot be employed in place of quinine, is pernicious fever. Quinetum requires more time to act than quinine, and as rapidity of action is absolutely necessary in this disease, quinetum cannot be used in it as a substitute for quinine.

2. In all forms of pure malarial intermittent fever, quinetum has the same apyretic effect as quinine, but is less powerful, and acts more slowly. It must therefore be given in larger doses and at longer intervals before the ague fit, than quinine.

3. Quinetum does not produce the unpleasant and even dangerous symptoms of quinine when given during the fit, and may be taken during the fit without causing any unpleasant feeling.

4. Quinetum never causes noises in the ear.

5. Persons who are liable to suffer from the toxic effects of quinine, and who therefore cannot take it without the greatest discomfort, can take quinetum without this unpleasant effect, and yet obtain a similar therapeutical result.

6. The influence of quinetum in chronic cases is greater than that of quinine.

7. The tonic action of quinetum is similar and perhaps even greater than that of quinine.

8. The action of quinetum in cases of masked or larval malaria, and especially in rheumatic affections due to malarious influences, is incomparably greater than that of quinine.

Ferrum Albuminatum Solutum. C. Bernbeck. (*Archiv der Pharmacie*, Dec., 1877 ; from *Amer. Journ. Pharm.*, 1877, 126.) Dr. Friese, of Illingen, near Saarbrücken, has added a very valuable and therapeutically important preparation to the materia medica by publishing a formula for the preparation of ferrum albuminatum in the *Berliner Klinische Wochenschrift*. His formula reads as

follows :—Mix the white of an egg intimately with 10 grams liq. ferri sesquichlorati by triturating them in a mortar; remove the excess of chloride of iron by washing with distilled water; and redissolve by macerating for two days the precipitate in half a litre of distilled water, previously acidulated with twelve drops of pure hydrochloric acid.

Numerous experiments made by the author proved that only in the following manner, by carefully avoiding an excess of hydrochloric acid in the ferric chloride, a preparation may be obtained answering to the description given by Dr. Friese. It is well known that the officinal liquor nearly always contains an excess of hydrochloric acid, which in the preparation of ferrum albuminatum will cause a solution of the greater portion of the precipitate, which will then necessarily go to waste by washing. This loss is avoided by using a neutral ferric chloride obtained in the following manner :— Dissolve six parts of dry ferric chloride obtained by evaporating the officinal liq. ferri sesquichlorati in ten parts of distilled water; filter and mix the filtrate immediately with twenty parts of the white of eggs; place the brownish yellow magma on a moistened strainer, press well with the hands, and repeat it several times, after the addition of a little distilled water, until the excess of chloride of iron is removed. Dissolve the residue in half a litre of distilled water acidulated with twelve drops of hydrochloric acid, by macerating for one or two days, and filter.

Dr. Friese administers this preparation in chlorosis without the addition of phosphorated ether; it must then always be freshly prepared. As a remedy for rhachitis he prescribes an addition of twelve drops of a solution of 0·05 gram phosphorus in 30 grams of ether to 250 grams of the iron albuminate solution, which keeps the latter unaltered for at least six weeks, and permits it to be kept on hand for that length of time.

Liquid Albuminate of Iron. Dr. J. Biel. (*Pharmaceut Zeitschr. für Russland*, 1878, Nos. 5–7.) The author criticises the formula previously suggested, and arrives at the conclusion that the most agreeable and useful solution for internal administration should contain 0·03 per cent of metallic iron. It is, however, advisable to keep in stock a more concentrated solution, and to dilute it just previously to using.

Ferrum Albuminatum Siccum. E. Merck. (*Pharmaceut. Zeitung*, March, 23 and 30, 1878.) The author states that dry albuminate of iron, which only requires solution in water to make Friese's (or, according to Merck, Friesse's) solution, has been manufactured at

his laboratory for several years past, and consists of small brownish red shining crystals, is not hygroscopic, slowly dissolves in 50 parts of cold water, and more readily in the same solvent at 30° to 35° C. Its solution is translucent and opalescent, neutral to test paper, but will precipitate oxide of iron in flakes after standing for some time. On gradually adding ten to twelve drops of pure muriatic acid, sp. gr. 1·12, the solution becomes clear; in case a slight turbidity remains, it can be removed by filtration. After mentioning that Schlickum was unsuccessful in all his experiments with dry albuminate of iron, there being always an insoluble residue amounting to 20 per cent. on re-dissolving the coagulum of chloride of iron and albumen obtained by evaporating to dryness, Dr. Hoffmann suggests to mix the chloride of iron and albumen in a certain proportion, each previously reduced to a fine powder; thus the insoluble residue will be avoided. He operates as follows:—15 parts of crystallized chloride of iron ($Fe_2 Cl_6 + 12 H_2 O$, containing 20 per cent. of metallic iron), or 20 parts of liquor ferri sesquichlorati, are dried with 10 parts of dextrin at 40° to 50° C., and pulverized; then 80 parts of pulverized albumen are mixed with it. The latter is obtained by mixing fresh albumen with half its weight of water, setting aside for several hours, then removing the membrane by straining, and finally evaporating on flat plates at a temperature of 30° to 40° C., which is easily accomplished, albumen being not in the least hygroscopic. When dry it is easily removed from the plates. The author considers this dry albuminate of iron by far preferable for making Friese's solution, claiming that in this manner the solution will always have an uniform taste, composition, and strength.

A Device for Perforating Plaisters. J. P. Remington. (*Amer. Journ. Pharm.*, April, 1877.) This device, or tool, consists of a brass cylindrical wheel, three-quarters of an inch wide, five-eighths of an inch in diameter, with two circular depressions turned out of each end, a quarter of an inch deep, leaving a hub on each end of the wheel through which a steel axle passes into the prongs of a steel handle, which is driven into an ordinary tool handle nine inches long. The cylindrical wheel is studded with sixteen punches, arranged on either side, half an inch apart alternately; these punches are of steel, tapered, and are a quarter of an inch long and one-eighth of an inch bore at the end, making a one-eighth inch perforation.

To operate the tool, all that is necessary is to dip it first in water; then, having secured the plaister by tacking it to several layers of old newspapers on a rather low counter, grasp the tool tightly with

both hands and drive the punches with some force through the plaister, pushing it along from the operator, the wheel revolving as it is pushed forward, the little disks of plaister collect in the punches, stick together, and form a core which falls towards the axle of the wheel and is driven out by the inclined hub.

A cheaper tool could be made with but one series of punches arranged on the wheel; but two series have the advantage of doing the work more quickly, and less skill is necessary to operate it. Hand made plaisters, spread on kid, may be perforated in this way by hand, and physicians may order any combination that they may desire, and secure one of the advantages of the machine-made plaisters. The tool should be cleaned with a cloth, moistened with a little turpentine, and kept in a box to prevent the punches from being injured by coming into contact with hard objects.

Lunar Caustic. (*Schweiz. Wochenschr. für Pharm.*, 1877, Nos. 7 and 13) Druggists are occasionally required to supply lunar caustic and sometimes caustic, diluted with potassium nitrate, in sticks of a given diameter. Where metallic moulds are not available, they may be substituted by a hollow cylinder made of parchment paper, with the edges secured by means of mucilage. These moulds are placed in an ordinary test tube, and when the mass has solidified, the paper may be removed, the stick being quite white. A. Huber draws the fused mass carefully into glass tubes of the proper diameter, so as to avoid the formation of air cavities; after the mass has solidified, the glass tube is heated over a spirit or gas lamp, until the surface of the silver salt becomes soft, when the stick may be easily pushed out with a wire.

Preparation of Peptone. M. Hobe. (*Pharm. Zeitung*, xxii., No. 102; *New Remedies*, 1878, 46.) The best process for preparing the so-called peptone, or pancreatic meat solution, is due to Dr. Adamkiewicz. Fresh blood is converted into a colourless mass by quirling and protracted kneading, followed by washing with frequently renewed soft water, holding in solution a small quantity of ammonia. The pressed white fibrin thus obtained is comminuted into fine shreds in capacious dishes, and covered with a large quantity of water containing 0·2 per cent. of hydrochloric acid. The fibrin thereby soon swells up, and gradually becomes converted into a pellucid jelly, which is now ready for the addition of the ferment, namely, pepsin. The latter is obtained from the mucous membrane of the hog, and for the present purpose is preferably extracted by means of glycerin. Alcohol is first added to the finely cut membranes, in order to coagulate the albumen, after which they are

dried by exposure to air, and then covered with glycerin, which abstracts the pepsin in the course of a few weeks. The clear yellowish red glycerole of pepsin is poured over the fibrin-jelly, and the whole heated for some time in a water bath at a temperature of 50°–60° C. (122°–140° F.) The compact mass soon begins to liquefy, and is converted finally into a thin fluid of grey opalescent colour. In from two to five hours large masses of fibrin may in this manner, as it were, be digested. The crude liquid is now separated by straining from any undigested shreds, and carefully neutralized with sodium carbonate, which causes the separation of a flocculent grey precipitate, the so-called para-peptone. This is removed by filtration. The filtrate, which has a clear straw yellow colour, is faintly acidulated, once more filtered and evaporated to the consistence of honey at a temperature not exceeding 70° C. (158° F.).

Peptone is distinguished from ordinary albumen by its proneness to solidify in the cold, and to return to a liquid state when heated, being thus just the reverse of albumen. For internal administration it has been found best to mix it with extract of beef in the proportion of five parts of the latter to one hundred parts of peptone. Sixteen grams, or one spoonful, of this peptone are equivalent, in nutritive power, to twenty grams of lean meat. A dry peptone may be prepared by precipitating the original liquid with alcohol, treating the precipitate repeatedly and for some time with alcohol and ether, then dissolving in a little water, and drying at 30° C. (86° F.). In this state it forms a glassy, brittle mass, easily pulverizable and readily soluble in water. Long keeping is said to impair its solubility. It has a neutral reaction, and reduces alkaline copper solution.

Butyl-Chloral Hydrate. The following are the concluding paragraphs of a paper on butyl-chloral hydrate—otherwise known as croton chloral hydrate—which appeared in the *Medical Examiner* of June 28th.

"With regard to the internal administration of butyl-chloral it may, perhaps, be given in larger doses than the drug for which it is proposed as a substitute. It is said that as a hypnotic from twenty to forty-five grains may be administered at bed-time. For the purpose of producing sleep, however, we prefer ordinary chloral, unless under special circumstances, and then we should decidedly object to the larger doses mentioned. Probably when chloral is contra-indicated by heart disease, it would be well to forego butyl-chloral also. In all cases it would be safer to give a smaller dose and repeat it than to charge the system with the full quantity at

once. The effect of a small dose passes off frequently in about two hours, when it can be repeated if need be, with safety; or if no effect whatever were produced, another dose could be given even earlier. An alcoholic solution is liable to undergo some change which is said to impair its anti-neuralgic power. This is probably true of all solutions, and we should therefore advise it in all cases to be freshly prepared. It is commonly given in syrup, but a good solution may be readily made with glycerin. The following mixture contains enough to supply at once, and is not likely to be dangerous:

℞	Butyl-chloral Hydrate	ʒss.	
	Glycerinæ	℥ss.	
	Aq. destil. ad	℥vj.	M.

"Two tablespoonfuls of this, containing only five grains, can be repeated in half an hour two or three times in succession, until the pain is relieved, and then less frequently. It should be still further diluted when taken, as the taste is very pungent. Some have recommended grain or two grain doses to be given, but we cannot report favourably of these small quantities; nor can we understand how those who advise large doses as a hypnotic can expect insignificant ones to assuage the pain of tic. We prefer to avoid the use of massive doses on the one hand, or to trifle with pain on the other. It is better to trust to the local action than to minute doses internally for the relief of pain; while as a hypnotic butyl-chloral is not so effectual as chloral, which is accordingly in most cases to be preferred. But a combination of the two drugs sometimes induces sleep when either alone fails. If a few doses of butyl-chloral give no relief to pain, it is seldom advisable to continue it."

Antihydropin. Dr. Bogamolow. (*Amer. Journ. Pharm.*, 1877, 371, from *Pharmaceut. Zeitsch. für Russland.*) The author obtained a crystalline principle from cockroaches, *Blatta orientalis*, L., and which he has used with success in six cases of dropsy, for which the cockroaches in Russia are valued as a popular remedy. He has used them in the form of powder, tincture, and decoction, and observed that the quantity of urine is augmented, and albumen, if present, decreased; the œdema of hands, feet, and face, subsides rapidly, the weight of the body is diminished, and perspiration increased. The remedy does not disturb digestion, nor, like cantharides, irritate the kidneys.

Elixir of Hops. J. H. Kimports. (*Ibid.*, 1877, 551.) The author suggests the following formula as yielding an agreeable preparation:—

Hops ʒij., cloves and anise each gr. lx., cinnamon gr. lxxx., all in fine powder, are mixed and macerated in a portion of the menstruum obtained by dissolving oil of orange f ʒiiss. in alcohol and water each f ʒxij. After twenty-four hours the powder is firmly packed into a percolator and displaced until twenty-four fluid ounces have been obtained, in which sugar ʒxij. is dissolved. Each fluid ounce represents thirty grains of hops, the bitter taste of which is nicely blended with the aromatics.

Chrysophanic Acid in Skin Disease. Dr. J. C. O. Will. (*Med. and Surg. Report*, Jan. 12.) The author remarks: The introduction of this new remedial agent, apparently possessing the power of effecting a cure in a short space of time, seems a real gain; and if more extended trials are followed by equally beneficial effects, there is every reason to believe that chrysophanic acid will soon be regarded as the most reliable and quickest method of treating psoriasis.

It has one disadvantage, however, which renders its use rather objectionable in private practice, viz., that it stains the clothing of the patient and bed clothes a purple colour, which will not wash out; but it may be reasonably expected that some means will be devised by which this may be overcome.

When prescribing chrysophanic acid, it is a wise precaution to warn the patient against allowing it to come in contact with the eyes, as it gives rise to intense irritation, accompanied by great dilatation of the pupils. The irritation subsides spontaneously in the course of a few days.

Filtering Milk through Fir Tops. F. Trachsel. (*Chem. News*, xxxvii., 50.) The author having noticed that many parts of Switzerland are noted for their good milk and superior butter, a simple and valuable method of removing any *gouty* or *sweaty* odour from the milk is in regular use there. The milk, as soon as it is drawn and whilst warm is filtered through a sprig of washed fir-tips, the stem inserted loosely and upright into the hole of a funnel. The milk being poured on this bunch of clean spicular leaves, deposits hairs, skins, clots, or gelatinous sliminess, as the case may be, on the little spikes. A fresh sprig is used at each milking. The milk that drains is clean, and especially of a fresh flavour, or so slightly aromatised as to retain no unpleasant resinous odour; but becoming, as it were, "cured," it does not turn sour as soon as milk strained through wire gauze. Horsehair strainers are difficult to keep sweet, they often propagate decay by the film of animal matter which they retain, especially close to the joints of the wood. No insects are ever found in fir tips, whilst *Asperula* and many other

herbs occasionally abound in them, and they cannot be used in winter except in the dry state, when their odours are mostly gone. The fir-tips are rinsed only to remove dust; they are obtainable fresh even during winter, as the fir is an evergreen.

Hypophosphite of Berberine. J. U. Lloyd. (*American Journ. Pharm.*, July, 1877, 339.)

℞	Sulphate of Berberine	1 part.
	Distilled Water	24 parts.
	Oxide of Lead	½ part.
	Hypophosphorous Acid	q. s.

Dissolve the sulphate of berberine in the distilled water at the temperature of 180° F. Add the oxide of lead and digest at the above temperature until a filtered portion will not produce a precipitate with solution of acetate of lead (or a hot solution of chloride of barium); from six to twelve hours will accomplish this. Filter out the excess of lead and sulphate of lead formed, pass sulphuretted hydrogen through the solution to separate any traces of lead which may remain, and filter again. Evaporate the solution of berberine to the measure of 8 fluid ounces, add solution of hypophosphorous acid until in slight excess, and allow the mixture to cool. Separate the magma of fine crystals with a filter paper or muslin strainer, and dry.

Hypophosphite of berberine is a beautiful yellow salt, much more soluble than the hydrochlorate. In the author's opinion it is the most desirable combination of berberine for medicinal use.

By substituting other acids for the hypophosphorous, almost any salt of berberine can be readily produced by the same process.

Comparative Action of Quinine, Cinchonine, and Cinchonidine. (*Chem. and Drugg.*, 1877, 436.) MM. Laborde and Dupuis have reported some experiments made on dogs to elucidate this point. The experiments were made by injecting subcutaneously large doses of the alkaloid. One dog, treated with 15 grains of quinine, was, at the end of half an hour, in a stupefied condition. Another was treated with twelve grains of cinchonine. According to the experimenters, there could not have been a more distinctly marked attack of epilepsy than that caused by the alkaloid. Twelve grains of cinchonidine caused a similar but less violent attack. It must be noted that these doses are enormous when compared with the size of the animals to which they were administered.

New Anæsthetics. Prof. M. Kendrick and Dr. Ramsey. (*Med. Press and Circular.*) The authors have been experimenting

with substitution products obtained with pyridine and chinoline. The latter of these bases is extracted from quinine by means of caustic potash, but also may be procured by some of the coal-tar series of substitutions. Three grains of the chloride of chinoline introduced into the circulation of a rabbit rendered the animal unconscious in eight minutes, but the pulsation of the heart continued and the breathing was vigorous. The rabbit recovered after two or three hours, and the experiment is deemed highly successful. Some of the other derivatives from these bases proved to be very powerful poisons, having specific actions upon the vital centres, and likely to be of use in the materia medica.

Artificial Champagne. R. Hennig. (*Chem. Centralb.*, 1878, 110–112.) A wine of the Rheinpfalz, Rheingan, or Neckar, is freed from albuminoids by tannic acid, excess of which is then removed by precipitation with gelatine, after which the wine is left at rest for eight days. It is then filtered through kaolin and charcoal, and flavoured by the addition of sugar, tartaric acid, glycerin, and cognac, or spirits of wine. An agreeable aroma may be imparted to the wine by the use of some extract, such as extract of violet or orange-blossom water. The flavoured wine is again filtered and saturated with carbonic acid, under a pressure of five atmospheres. The author states that genuine French champagne contains 0·6 per cent. free acids, 8·5 alcohol, 8·5 sugar, 0·8 to 1·0 glycerin, and 12·5 of extractive matters.

Hypodermic Injections of Digitaline. Dr. Gubler. (*Brit. Med. Journ.*) At a recent meeting of the Paris Société de Thérapeutique, the author announced that, after having made many attempts to utilize the active principles of digitalis in subcutaneous injections, he believes that he has attained his object. He uses a solution containing 0·2 per cent. of Homolle and Quevenne's amorphous digitaline in equal parts of water and alcohol. One gram of this solution contains two milligrams of digitaline. He injects half of the contents of the syringe; that is to say, one milligram of digitaline, and obtains all the effects of digitalis. These injections do not bring on any local accidents.

Hydrochlorate of Pilocarpine. Dr. Zaubzer. (*Pharm. Zeitung*, 1877, No. 25.) This preparation has been much employed by the author, who finds it somewhat inferior as a diaphoretic to jaborandi, but decidedly superior to the latter on account of its not producing nausea or emesis, nor any of the unpleasant after effects, as headache or vertigo, which so frequently follow the administration of jaborandi.

The Removal of Stains. (*Chem. and Drugg.*, 1877, 435.) The stains easiest to remove are those of sugar, gelatine, blood, and albumen; a simple washing with water is all that is necessary for all kinds of fabrics.

Grease Spots.

For *white linen or cotton goods*, use soap or weak lyes.

For *coloured calicoes*, warm soap suds.

For *woollens*, soap suds or ammonia.

For *silks*, benzine, ether, ammonia, magnesia, chalk, yolk of egg, with water.

Paint, Varnish, and Resin Stains.

For *white or coloured cotton and woollen goods*, oil of turpentine or benzine, followed by soap suds.

For *silk*, benzine, ether, soap; hard rubbing is to be avoided.

Stearin, Sperm Candles.

For all kinds, use 95 per cent. alcohol.

Wine and Fruit Stains.

White cotton or linen.—Fumes of burning sulphur, warm chlorine water.

Coloured cottons or woollens.—Wash with tepid soap suds or ammonia.

Silks.—The same, with very gentle rubbing.

Alizarine Ink.

White cottons and linens.—Tartaric acid in solution; the older the stain, the more concentrated the solution should be.

Coloured cottons and woollens and silks.—A weak solution of tartaric acid, if the colour allows of its use.

Rust, Nutgall Ink.

White cottons and linens.—Warm solution of oxalic acid, dilute muriatic acid followed by granulated tin.

Coloured cottons and woollens.—Repeated washings with a solution of citric acid, if the colour is fast.

Silks cannot be freed from these stains.

Lime, Lye, Alkalies.

White cottons and linens.—Wash with cold water.

Coloured goods and silks.—A weak solution of citric acid applied

with the tip of the finger to the spot previously moistened with water.

Acids, Vinegar, Orange Juice, etc.

White cottons and linens.—Wash with pure water, or warm chlorine water.

Coloured goods or silks.—Ammonia, diluted according to the fineness of the tissue and the delicacy of the colour.

Tannin, Walnut Shells.

White cottons and linens.—Javelle Water (liquor sodæ chlorinatæ), warm chlorine water, concentrated solution of tartaric acid.

Coloured goods or silks.—Chlorine water, diluted according to the tissue and its colour, each application to be followed by washing with water.

Tar, Axle Grease.

White cottons and linens.—Soap, oil of turpentine, and water, each applied in turns.

Coloured cottons and woollens.—First smear with lard, rub with soap and water, and let it stand for a short time; then wash with oil of turpentine and water, alternately.

Silks.—The same, using benzine instead of turpentine, and dropping the water from a certain height on the under side of the stain. Avoid rubbing.

Chrysophanic Acid Stains. Dr. B. Squire. (*Chem. and Drugg.*, 1878, 167.) The author has been trying to remove the stains left by chrysophanic acid on the linen of his patients. The stains are purplish brown, and very "fast." Acetic acid, which dissolves chrysophanic acid in a test tube, has no effect on linen stained with it. Dilute nitric acid changes the colour to a bright morcen without removing it. The author records in the *British Medical Journal* his final and successful experiment. He immersed a towel, which had been used at the British Hospital for Diseases of the Skin, in a strong solution of chloride of lime. Five hours after he tried to fish it out with his stick, but the stick went through the towel, and it was with difficulty that the latter was raised above the surface of the liquid. The towel was most effectually rotted, but, *Eureka!* it was white. The author's advice to his numerous inquirers now is to have the linen properly bleached with chloride of lime, which will probably remove the colour, but leave unimpared the strength of the fabric.

Dr. Walter Fergus, of Marlborough College, Wilts, writes to a later issue of the *British Medical Journal*, stating that he has found this method quite unavailing when the fabric stained is of linen, and he concludes that the acid dyes linen a "faster" colour than cotton.

Preservation of Fruit by means of Salicylic Acid. A. dal Piaz. (*Zeitschr. des oesterr. Apoth. Ver.*, 1878, 192.) Fruit may be preserved without boiling by dissolving three grams of pure salicylic acid and five grams of sugar in a litre of water, placing the fruit in this solution and covering the jar with bladder. Cherries, red currants, raspberries, pears, grapes, and gooseberries thus preserved were found to keep well for twelve months without showing any signs of fermentation. The fruit retains its full natural aroma, which is not the case with processes requiring heat.

Expressed fruit juices can be kept in the same manner without suffering the slightest loss of colour or flavour.

Hydrobromic Acid in Prescriptions. Dr. D. C. Wade. (*Druggists' Circular*, Nov., 1877.) The following are recommended as suitable formulæ :—

I.

Bromide of Potassium	120 grains.
Crystallized Tartaric Acid . . .	153 grains.
Water	1 fluid ounce.

Dissolve the salt, and then the acid, in water, and place in cold water for several hours, or until precipitation ceases, and decant. The results of the reaction are the formation of bitartrate of potassium (cream of tartar), which is nearly insoluble, and sufficiently pure hydrobromic acid diluted with water, each fluid dram of which contains ten grains of bromine. By preserving this proportion any quantity can just as readily be made. The author prescribed it most frequently in half-dram doses, well diluted.

II.

Dilute Hydrobromic Acid, Syrup, of each	1 fluid ounce.

Dose: half a teaspoonful in water.

This is not unpleasant to the taste, and may be given to obtain the constitutional effects of bromine, as usually administered in combination with a base. It also acts like other mineral acids in being tonic, refrigerant, solvent, alterative, etc., and is very useful in the "bilious" conditions, including fevers, where the morbid symptoms recede with the coating on the tongue.

III.

Sulphate of Quinine . . .	15 to 80 grains.
Dilute Hydrobromic Acid,	
Syrup, of each	1 fluid ounce.

Dose: half a teaspoonful in water.

This is extremely bitter, and, in this respect, cannot be improved by other additions. Like other acidulous preparations, it is incompatible with liquorice. Bromine has the power of modifying in a marked degree the cerebral effects of quinine; hence the value of its combination, aside from the alterative and other properties of the acid. In all cases of intermittent fever the author continues an antiperiodic from ten to thirteen days after the paroxysm ceases; and for permanent and other satisfactory results this combination has proved to be far superior to any other not containing the acid.

IV.

Sulphate of Cinchonine. . .	15 to 45 grains.
Dilute Hydrobromic Acid,	
Syrup, of each	1 fluid ounce.

Dose: half a teaspoonful in water.

The author prescribes cinchonine because of its cheapness, and finds it in many cases equal to quinine.

V.

Red Iodide of Mercury	1 grain.
Dilute Hydrobromic Acid . .	1 fluid ounce.
Fluid Extract of Orange Peel,	
Syrup, of each	4 fluid drams.

Dose: half a teaspoonful in water.

The iodide of mercury is decomposed, the bromide being formed with the elimination of the iodine in the form of hydriodic acid. Mercury may be given in this way for a long time without producing ptyalism, the salt being rapidly excreted.

VI.

Fluid Extract of Ergot,	
Syrup, of each	4 fluid drams.
Dilute Hydrobromic Acid . .	1 fluid ounce.

Dose: half a teaspoonful in water.

No other combination is said to equal this for efficiency in cases of cerebral hyperæmia. It is not only indicated where venesection would appear beneficial, but it may be administered by enema in a case of intercranial hæmorrhage, with the likelihood of arresting

the transfusion by capillary restriction, when an additional depletion of the arterioles by artificial abstraction of blood would still further endanger life without influencing the hæmorrhage, and is consequently positively contraindicated.

Ergot and hydrobromic acid will be found to be promptly useful in the vertigo of plethora with confusion of ideas, or where a determination of blood to the brain is prone to occur from other causes.

VII.

Fluid Extract of Stramonium	160 drops.
Dilute Hydrobromic Acid,	
Syrup, of each	1 fluid ounce.

Dose, half a teaspoonful in water; the dose to be increased until the specific effects of the stramonium are marked, and there to be maintained. This combination is offered as a prescription for epilepsy, its effects in this disease being remarkable, and in the author's opinion superior to any other treatment.

VIII.

Tartar Emetic	2 grains.
Denarcotized Tincture of Opium	2 fluid drams.
Dilute Hydrobromic Acid	1 fluid ounce.
Syrup, to make	2 fluid ounces.

Dose: half a teaspoonful in water.

For acute or chronic bronchitis:—

IX.

Syrup of Bromide of Iron	4 fluid drams.
Bromide of Quinine	16 grains.
Dilute Hydrobromic Acid	1 fluid ounce.
Syrup	4 fluid drams.

Dose: half a teaspoonful in water.

The wide applicability of this tonic is readily suggested by its composition.

X.

Subcarbonate of Bismuth	80 grains.
Dilute Hydrobromic Acid	1 fluid ounce.
Dissolve, and add,—	
Saccharated Pepsine	80 grains.
Syrup, to make	2 fluid ounces.

Mix and filter. Dose: half a teaspoonful in water.

The Administration of Santonin. E. M. Boddy. (*Med. Times and Gazette*, July 7, 1877.) Santonin, if allowed to remain in the

system, yields (according to Falck) xanthopsin, which is excreted with the urine, to which it imparts an intense yellow colour, changing to red on the addition of caustic alkalies. In the author's opinion it is this xanthopsin which gives rise to those dangerous symptoms that have been so frequently observed, and which many attribute to the santonin as such. This mischievous action he has found from experience to be entirely counteracted, or rather prevented, by administering a dose of calomel either together with or shortly after the santonin, which is thus removed as soon as it has done its work, and before its decomposition product can produce any injurious action on the system. Given in this way santonin never causes convulsions or retention of urine; nor will that secretion show the yellow colour alluded to, for the santonin is eliminated by the purgative action of the calomel before it has had time to form the poisonous xanthopsin.

Adulteration of Geranium Oil. M. Jaillard. (*Zeitschr. des oesterr. Apoth. Ver.*, 1878, 242.) Geranium oil obtained by distillation from *Pelargonium rosatum* is much used in perfumery, and is largely imported from Algiers and India. Its adulteration with oil of copaiba and other terpenes, which is now much practised, may be detected by adding 6 drops of the oil to 5 c.c. of alcohol of 70 per cent., and shaking the mixture. The pure oil thus yields a perfectly clear solution, whereas the adulterated article forms a more or less turbid mixture.

Metamorphoses of the Cantharides (Cantharis Vesicatoria). M. Lichlenstein. (*Journal de Pharmacie et de Chimie.* From *Chem. and Drugg.*, Nov., 1877, 439.) For forty years the author has been endeavouring to trace the history of the cantharides from the egg to the perfect insect. Only this year has he succeeded in the attempt. On June 27th he gathered some fecundated females from an ash tree, and confined them in a glass jar containing earth. Two or three days after they laid, in little cylindrical holes they had made, white hyaline eggs, agglomerated in masses of 30 to 60 each. Seven days after small larvæ, named *triongulius*, by Dufour, appeared from the eggs. They were a millimetre long, of a deep brown colour, with the meso and metathorax and the first segment of the abdomen whitish. The abdomen had at the extremity two long threads. After numerous tedious and unsuccessful trials, the author persuaded these little creatures to feed on the stomachs of bees killed in the act of sucking honey from flowers. Five or six days afterwards, when they had much increased in size, their skins split and a new form of larva appeared. These were milk-white without caudal appendages, and with a soft skin instead of the

leathery envelope from which they had just emerged. After more unsuccessful trials, they were induced to feed on the concreted honey of a bee of the genus *Ceratina*. They grew, and three times cast their skins. The jaws, at first smooth and pointed, gradually acquired on the inner surface one and then two teeth. The antennæ changed their form; the eyes, at first prominent, gradually diminished; and after about thirty days, when the larva had increased to about two centimetres in length, it showed signs of wishing to change its condition. It was allowed to burrow in the earth in a glass tube which could be withdrawn for examination. Nine days after, on September 17th, it was found that the larva had changed to a true chrysalis with a coriaceous shell. It was slightly curved, of a clear brown, with the head and feet showing themselves under little rounded projections. The final transformations from the chrysalis to the perfect insect will not take place until next spring. Up to this time only the first stage of the metamorphosis, that of the two-tailed larva, has been known. A complete account of the transformation, with illustrative drawings, will appear in the *Annales de la Société Entomologique de France*.

We learn from the current number of *Science Gossip* that specimens of the mature beetle have been occasionally found in England.

Preparations of Cubebs. L. F. Griffin. (*Amer. Journ. Pharm.*, 1877, 552.) The author found that light petroleum benzin (gasolin) dissolves from powdered cubebs 16·5 per cent. of oil and resin; while wax and cubebin are insoluble therein. Gasolin would therefore appear to be adapted for preparing an active oleo-resin of cubeb. The residue left after preparing tincture of cubeb from four troy ounces of the powder yielded to gasolin 115 grains of oleo-resin, and the two pints of tincture can therefore contain only 200 grains of the oleo-resin. Spirit of nitrous ether, which is used in Mettauer's tincture of cubeb, exhausts it thoroughly.

Elastic Gelatin Capsules. (From *Pharm. Zeitung für Russland*, March 15, 164.) Detenhoff recommended to prepare them from one part of gelatin, two of water, and two of glycerin, which, however, does not give a satisfactory mass, the capsules becoming opaque as the water gradually evaporates. The following formula is preferable, capsules made by it remaining transparent and elastic for years. Take one part of gelatin, two parts of water, and four parts of glycerin; soak the gelatin in the water, and dissolve with a gentle heat. Add the glycerin, and evaporate on a water bath until five parts remain; that is, until all the water is evaporated. Into this warm melted mass dip the moulds and proceed as usual.

Salicylic Acid and Salicylate of Soda in Neuralgia. Dr. Descroizilles. (*Phil. Med. Times*, from *Medical Record*, Sept. 1, 1877.) The author has employed salicylic acid and salicylate of soda in seven cases of neuralgia with satisfactory results. The number of cases is too small to permit a judgment to be formed from them of the therapeutic value of the two drugs, but they demonstrate the advantages which the salt possesses over the acid in the treatment of this disease. All the cases were cured, but in the three cases in which the acid was administered it produced a certain amount of deafness. In two of these cases it also exerted an energetic irritant action on the mucous membranes of the digestive and respiratory tracts, and in the other it caused vertigo, general weakness, and well-marked hebetude. The salt did not exert any injurious action either on the mucous membranes or on the nervous system. It was not necessary to give it in as large doses as the acid, and the cure was rapidly effected. From 1 to 5 grams of the salt were given daily, while in one of the cases treated by the acid as much as 7 grams were given in one day. In all the cases the treatment was begun with small doses (1 to 2 grams), which were increased by a gram a day until the desired effect was obtained.

Antidote to Carbolic Acid. Dr. Sanftleben. (*Pharm. Zeitung für Russland*, Feb. 15, 119.) On the recommendation by Professor Baumann, the author used sulphuric acid in several cases of poisoning by carbolic acid, with the best success, the phenol combining with the acid to phenyl-sulphuric acid, which is not poisonous. He administered it in a mixture composed of—dilute sulphuric acid, 10·0; mucilage of gum, 200·0; and simple syrup, 30·0 grams, in doses of a tablespoonful every hour.

Sapo Petrolei. (*Pharmaceut. Centralhalle*, 1878, 74.)

℞ Saponis domestici sicci . . . . . 22·0
Ceræ Japonicæ . . . . . 1·00
Minutim concisis et in cucurbitam vitream immissis affunde
Spiritus Vini diluti (0·892 pd. spec.) . . 75·0
Liquoris Sodæ Caustici (1·33 pd. sp.) . . 10·0
Digerendo agitandoque fiat solutio subdiaphana, cui adde
Petrolei Americani optimi . . . . 33·0

Fortiter agitando mixtione effecta, liquorem tepidum in modulum aptum funde, ut refrigeratus frustum quadratum præbeat, cujus anguli livigentur.

This soap is recommended as a valuable remedy in skin diseases.

Administration of Creasote. M. Tournier. (*Répert. de Pharm.*, 1878, 98. From *Amer. Journ. Pharm.*) The author recommends cod liver oil for masking the caustic taste of creasote and facilitating its digestion. He gives it in capsules containing ·02 gram ($\frac{1}{3}$ grain) mixed with ·50 gram ($7\frac{1}{2}$ grains) of cod liver oil. To be given by the spoonful this solution should be more dilute, so as to contain 1 gram of creasote to 150 grams of cod liver oil. He also recommends a *wine of creasote*, made by dissolving 6 grams of creasote in 125 grams of alcohol, and adding 400 grams of simple syrup and sufficient Malaga wine to make 1 litre. This is weaker but preferable to that made by Bouchard's formula, which contains in the same measure 13·5 grams of creasote and 30 grams of tincture of gentian, but no syrup.

Medicated Syrups. I. Davis. (Abstract from an Inaugural Essay. *Amer. Journ. Pharm.*, 1878, 327.) The author refers to some of the disadvantages of preparing syrups by boiling, and afterwards to Mr. Orynski's process for preparing syrups without heat (*Proceedings Amer. Pharm. Assoc.*, 1871, 451).

Simple Syrup was prepared by placing 36 troy ounces of granulated sugar in a conical glass percolator upon a perforated diaphragm, covered with a piece of linen, and gradually pouring distilled water upon it until the sugar was dissolved and the syrup measured 44 fluid ounces. The result was quite satisfactory. However, the application of the same process in the preparation of other syrups was not equal in its results to those obtained with the following process:—

Syrupus scillæ, made by the officinal process, becomes cloudy and separates a flocculent albuminous matter; but a permanently clear and transparent syrup is obtained by making a mixture of 2 fluid ounces of acetic acid and 30 of simple syrup, adding to a portion of this mixture 2 troy ounces of squill in moderately fine powder to obtain a thin paste, and setting this aside for four hours to allow of the swelling of the squill; it is then introduced into a conical glass percolator, in the neck of which a piece of wet sponge has been placed; the surface is covered with a disc of paper, and the mixture poured upon it. After this has disappeared from the surface, six fluid ounces of simple syrup are added, and the last portion of the syrup displaced by the gradual addition of water until the percolate measures two pints.

Syrupus Pruni Virginianæ.—Mix 5 troy ounces of wild cherry bark in moderately coarse powder with 2 fluid ounces of simple syrup; set aside for twenty-four hours in a close vessel, then transfer it to a conical glass percolator, and gradually pour upon it 30 fluid

ounces of syrup, and afterwards sufficient water to make the percolate measure 32 fluid ounces. Prepared in this manner, syrup of wild cherry bark is an elegant transparent syrup, having in a very marked degree the odour and taste of the bark.

Syrupus Senegæ.—Mix 1 fluid ounce of alcohol with 15 fluid ounces of syrup, and with two fluid ounces of this mixture moisten 4 troy ounces of senega in moderately coarse powder ; transfer this to a conical glass percolator, and gradually pour on it the mixture of alcohol and syrup, and when this has passed through, sufficient syrup to make the percolate measure one pint. Thus prepared, the syrup has the odour and taste of the root very decidedly.

In the same manner, using a mixture of 1 fluid ounce of alcohol and 15 of syrup, were prepared—

Syrupus rhei, from 720 grains of rhubarb, in moderately coarse powder;

Syrupus rhei aromaticus, from 120 grains of rhubarb, 15 grains of nutmeg, and 30 grains each of cinnamon and cloves, all in moderately fine powder;

Syrupus ipecacuanhæ, from 1 troy ounce of ipecac ;

Syrupus sarsaparillæ compositus, from 3 troy ounces of sarsaparilla, 180 grains of guaiacum wood, and 120 grains each of pale rose, senna, and liquorice root ; 3 drops of oil of anise, and 2 drops of oil of gaultheria are dissolved in the percolate ;

Syrupus scillæ compositus, from 1 troy ounce each of squill and senega ; 12 fluid ounces of percolate are obtained and mixed with a solution of 12 grains of tartar emetic in 2 fluid drams of hot water ;

Syrupus krameriæ, from 3 troy ounces of rhatany, in moderately fine powder.

Several of the syrups were also prepared without the addition of the fluid ounce of alcohol, which, however, the author does not consider objectionable, but, on the contrary, preferable. Although it takes a longer time to prepare a syrup in this manner than by the officinal process, the one suggested is claimed to yield better results, because no injury by heat can occur, and because no principle is taken up in the early part of the process to be discarded and filtered out towards the end. The essay was accompanied by specimens of the syrups prepared in September, 1876.

Tinted Capping Paper. (*Pharm. Journ.*, 3rd series, viii., 348.) Tinted paper for covering corks may be prepared as follows :—1 gram of any aniline colour is dissolved in 30 grams of strong alcohol, 300 grams of distilled water are added, and finally a solution of $1\frac{1}{2}$ gram of tannin in 15 grams of alcohol. The tannin acts as a mordant.

Moderately sized white paper is spread on a marble slab, or other smooth, hard surface, and the colouring liquid is applied in even horizontal lines by means of a small sponge. The paper is then hung up to dry, and may be covered after a few days with a concentrated solution of sodium silicate, to every 100 parts of which 10 parts of glycerin have been added, if it is desired to impart to it a gloss.

Arsenical Capping Paper. J. B. Barnes. (*Ibid.*, 327.) The author directs attention to a magenta coloured capping paper, which contains notable quantities of arsenic, and the colour of which has evidently been prepared by oxidizing anilin by means of arsenic acid. The bare suspicion of extraneous arsenic finding its way into *medicine* must be sufficient to insure its instant abandonment by those who have not already suspected that the paper contains arsenic.

Aromatic Syrup of Liquorice. (*Amer. Journ. Pharm.*, 1877, 578.)

℞	Pulverized Extract of Liquorice . .	4 ounces.
	Jamaica Ginger,	
	Cinnamon Bark, each	2 ounces.
	Cloves	1 ounce.
	Sugar	60 troy ounces.
	Water	a sufficient quantity.

Reduce the ginger, cinnamon, and cloves to a coarse powder, and boil in two pints of water over a slow fire for one hour. Then strain and dissolve in the liquid the pulverized extract of liquorice, with the aid of a gentle heat, stirring to assist the solution. When dissolved add the sugar, keeping up the heat till the latter is also dissolved. Then strain while hot, and add hot water through the filter to make four pints of finished syrup.

The above syrup disguises the taste of quinia better than syrup of liquorice root, the aromatic elixir of liquorice, or the simple syrup of the extract of liquorice. It will completely cover the taste of twenty grains of quinia sulphate in one ounce of the syrup, and only a slightly bitter taste will be developed ten or fifteen minutes after taking, which, however, may be removed by taking a draught of black coffee with sugar.

Thielmann's Cholera Drops. (From *Chic. Pharm.*)

℞	Ol. Menth. Pip.	3 parts.
	Alcohol Fort.	25 ,,
	Chloroform Purif	2 ,,
	Dissolve, and add—	
	Tinct. Opii	10 ,,
	Vini. Ipecac	25 ,,
	Tinct. Valerian . . .	40 ,,

Mix. Dose: a teaspoonful for adults.

Pile Ointment. (*New Remedies*, January, 1877.)

℞	Ceræ flavæ	8 parts.
	Resinæ	4 ,,
	Adipis	12 ,,
	Olei Sassafras	2 ,,

Melt the wax, resin, and lard; remove from the fire, add the oil of sassafras, and stir until the mass is solid. This is said to be a most excellent application for painful or itching piles.

Russian Drops. (*Ibid.*, 28.)

℞	Tinct. Valerian, Ether	2 fl.ʒ
	Vin. Ipecac	1 fl.ʒ
	Aceti Opii	20 min.
	Ol. Menth. Pip.	5 drops.

One dose: to allay the violent vomiting in cholera.

Liquids for Preserving Microscopic Objects. F. Meyer. (From *Gazette Hebdomadaire*, October 12, 1877.)

1. *For Larvæ, Hydræ, and Nematodæ.*

Glycerin, chemically pure	1 part.
Distilled Water	2 parts.

To ten parts of this mixture add one part of the following solution:—

Pyroligneous Acid	100 parts.
Salicylic Acid	1 part.

2. *For Infusoria.*

Glycerin	1 part.
Distilled Water	5 parts.

To ten parts of this add one part of the above solution of salicylic acid.

3. *For Algæ.*

Glycerin	1 part.
Solution Salicylic Acid	1 part.
Distilled Water	20 parts.

Elixir of Nux Vomica and Aromatic Tincture of Angostura. E. J. Davidson. (*Amer. Journ. Pharm.*, 1878, 22.) A pleasant aromatic tincture of angostura, which is a fair imitation of the so-called angostura bitters, is obtained by the following formula:—

℞	Powdered Angostura	ʒij.
	,, Cascarilla	ʒiv.
	,, Bitter Orange Peel	ʒiv.
	,, Cinnamon	ʒiv.
	,, Cardamom,	
	,, Cloves,	
	,, Nutmeg	āā ʒij.
	,, Coriander	ʒij.
	,, Anise	ʒv.
	Glycerin	f ʒij.
	Dilute Alcohol	sufficient.

Mix the glycerin with a pint of the diluted alcohol, moisten the mixed powders, pack into a percolator, and displace first with the mixture, afterwards with diluted alcohol until two pints of tincture are obtained.

This tincture will assist in disguising the disagreeable bitter taste of nux vomica, and an elixir of the latter, not unpleasant in taste, may be obtained as follows:—

℞	Tincture of Nux Vomica . . .	gtt. cxx.
	Curacoa Cordial	f ʒiij.
	Syrup of Orange Peel	f ʒiiss.
	Aromatic Tincture of Angostura . . .	f ʒss.

Mix.

The dose of this elixir will be about a tablespoonful, representing 10 drops of tincture of nux vomica; the proportion of the latter may, of course, be varied if desirable.

Gowland's Lotion. (*Chic. Pharm.*, June, 1878, from *New Remedies.*) Make an emulsion of one ounce of blanched sweet almonds, two-thirds of a dram of bitter almonds, and half a pint of distilled water. To the strained emulsion, under stirring, gradually add a solution of fifteen grains of corrosive sublimate in half a pint of distilled water. Finally, add enough water to make the whole measure one pint. This is used as a cosmetic, by wetting the skin with it and gently wiping it off with a cloth. It is also used as a wash for obstinate eruptions and minor glandular swellings and indurations.

Sapo-iodo Bromatus (Bromo-iodine Soap.) Dr. H. Hager. (From *New Remedies.*)

℞	Oil of Poppy Seed	300 parts.
	Water,	
	Solution of Caustic Potash,	
	Solution of Caustic Soda . . .	āā 100 parts.

Heat in a porcelain vessel on a water bath under constant stirring, until saponification has taken place; then add,—

Potassium Iodide	10 parts.
Potassium Bromide	5 ,,
Sodium Hyposulphite	30 ,,
Potassium Sulphide	10 ,,
Sulphur, precipitated	2·5 ,,

Previously reduced together to a fine powder.

Divide the product into two portions, each of which is intended for one application in form of a bath.

Salicylic Sulphite of Sodium. Dr. C. Pavesi. (From *Journ. de Pharm. d'Anvers*, Jan., 1878.) The author proposes to employ a

compound of salicylic acid and sulphite of sodium in such affections where the use of either remedy would be indicated, chiefly for the reason that the resulting compound appears to be more soluble than either substance by itself, and because the salicylic acid retards the decomposition of the sulphite. To prepare it, he directs to dissolve one part of salicylic acid and two parts of sodium sulphite in a sufficient quantity of water raised to the temperature of 50°–60° C. (122°–140° F.). On cooling, the compound (or rather mixture) crystallizes out, having an opal-blue tint, and possessing the tastes of both constituents. The crystals are very soluble in water.

Antiseptic Dressings. (*Brit. Med. Journ.*, Mar., 1878.) An article with this title, in a recent number of the *Progres Médical*, gives an account of the antiseptic materials which seem to have superseded Lister's carbolized gauze, and which claim for themselves greater economy, diminished irritability, and freedom from liability to poisoning.

Thiersch has come to the conclusion that a saturated solution of salicylic acid—that is to say, 1 to 300—prevents putrefaction of the blood and secretions of a wound, while it produces no irritating effect upon recent or granulating wounds, and gives no cause for alarm by the passage of salicylic acid into the circulation. He uses a solution of salicylic acid for washing instruments, and the hands of the operator and his assistants. The spray is of salicylic acid, which proves, however, very irritating to the mucous membranes of the persons engaged in the operation. The dressings are simple enough. Salicylic acid being non-irritant, no protective is required, according to Thiersch; but, at least, in healing surfaces, the protective has the additional advantage of protecting the granulations and the delicate new epithelium covering them from the danger of sticking to and being injured by the dressings on their removal. But Thiersch uses no protective. He places immediately upon the wound a layer of wadding containing 3 per cent. of salicylic acid; then another layer containing 10 per cent.

Blaser, pharmacist to the hospital at Leipzig, employs the following formulæ for the preparation of these dressings:—*For the 3 per cent. wadding:* Dissolve 750 grams of salicylic acid in 7500 grams of alcohol of specific gravity 830; add 150 litres of water at 70° to 80° C. (158° to 176° F.); place in the mixture 25 kilograms of cleaned wadding. *For the 10 per cent. wadding:* Dissolve 1 kilogram of salicylic acid in 10,000 grams of alcohol of specific gravity 830. Add 60 litres of water at 70° to 80° C. Place in the mixture 10 kilograms of cleaned wadding. To saturate the wadding he

uses a shallow vat, in which it is laid layer by layer, taking care not to put in more than two or three kilograms at one time, and that one layer is well saturated before the next is put on. When all are in, they are to be turned over, so that the bottom one comes to be at the top, and left for ten minutes; then removed; and, as they cool, the salicylic acid crystallizes out. Finally, the wadding must be dried in a warm place. Thiersch has also tried a dressing composed of jute saturated with salicylic acid; but the powder was disengaged in large quantities, and was extremely disagreeable to the surgeon; and it proved, besides, too permeable to the secretions of the wound, being less cohesive and fine than the wadding; so Thiersch himself has abandoned it.

Köhler, Medical Director-General of the Prussian army, has suggested the use of carbolized jute. The preparation is very simple. The jute is made up into cakes 1 to 2 centimetres thick, 15 centimetres in diameter, and weighing 4 or 5 grams. They are left to soak some hours in a 5 per cent. solution of carbolic acid, and are then left in a 2 per cent. solution until required for use. To apply them, the wound is covered with a slip of gutta-percha instead of the protective; then some cakes of jute; and the whole is kept in place by a gauze bandage. It requires to be renewed every three or four days; earlier, if there be discomfort, or the discharge have come through; later, if the patient remain well. It is calculated that Thiersch's wadding is about a third cheaper than Lister's gauze, while Köhler's dressing only costs about a twentieth of the price of the latter. Cheaper, and at the same time efficient, antiseptic dressings are desiderata, and we think that these may be found as useful here as they are said to be in Germany.

Thymol Dressings. (*Chem. and Drugg.*, 1878, 111.) The powerful antiseptic action of thymol, exceeding under some conditions that of carbolic acid, its comparatively non-poisonous nature, and the absence of irritating effect when it is applied to the skin, all point to its use as a substitute for carbolic acid in the now well-known antiseptic treatment of surgical cases elaborated by Professor Lister. This substitution has been made with great success by Professor Volkmann, of Halle. For the spray solution, this gentleman uses a mixture of 1 part thymol, 10 alcohol, 20 glycerin, 1000 water; but we understand that a solution in water only, which will not deposit, may be made by adding 1 part of thymol to 1000 of hot water. For the gauze dressings used by Professor Lister, others were substituted, made by saturating 1000 parts of bleached gauze with a mixture of 500 parts spermaceti, 50 resin, and 16 thymol.

This prepared gauze is extremely soft and pliant, and, to use the words of the reporter, sucks up blood and the secretions of a wound like a sponge. The fibres of the gauze being impregnated with spermaceti, cannot, of course, become saturated with the secretions, so that they do not become stiff.

Grindelia Robusta in Whooping Cough. Dr. Pattee. (*New Remedie*, 1877, 362.) At a recent meeting of the Suffolk District Medical Society, the author called attention to the beneficial effects of the drug in certain pulmonary affections, and remarked that most of the fluid extract sold in the market was said to be worthless. He (Dr. Pattee) had used the tincture in bronchitis, asthma, and whooping cough, in doses of half a dram or more, repeated every one or two hours. The effect was said to have been curative in thirty cases of whooping cough, after three or four days, without the occurrence of relapses. The dose for a child two years old would be about ten drops.

Hypodermic Application of Nitrate of Silver. (*L'Union Medicale.*) In obstinate neuralgic affections, particularly in ischias, as well as in other painful complaints, such as arthritis, hypodermic injections of silver nitrate are recommended by Le Dentu. Two to three drops of a strong (1 in 5) solution constitute one dose, which is followed by considerable pain, and in three or four days by an abscess, while the original pain has nearly always disappeared. These abscesses, after having been opened, heal rapidly in four or five days. He prefers this method to the employment of Vienna paste, the actual cautery, or other caustic applications.

Notes on the Value of Mushrooms as Food. G. Husemann. (*New Remedies*, 1877, 140.) The popular use of edible mushrooms, and the problem how to facilitate their general employment without risk of poisoning, is a theme which deserves the highest attention of public economists. A valuable article of food, which occurs nearly everywhere in colossal proportions, is at present completely neglected, although it is worthy, on account of its chemical composition, to be placed by the side of meat, the most important nitrogenous food of man. In many portions of Germany the vegetation of fungi, in favourable years, is so prolific that a single person is able to collect in ten or fifteen minutes sufficient food for several families—not to speak of such giant mushrooms as *Fistulina hepatica*, a single one of which sometimes attains a weight of thirty pounds, capable of furnishing sustenance for a whole family. *Clavaria Botrytis* and *Clavaria flava*, *Boletus edulis*, and other allied species occur in such immense quantities that the gathering of several hundredweights

would be a very easy task. The food value of mushrooms has heretofore been made the subject of exhaustive investigations by Kohlrausch and Siegel, who found in 100 parts of *dried Morchella esculenta*, 35·18 per cent. of protein, in *Morchella conica*, 29·64 per cent., and in *Helvella esculenta*, 26·31 per cent., besides about 2·3 per cent. of fatty matters, and a considerable quantity of sugar (mannite); in *Morchella esculenta* (dried), as much as ten per cent. In addition, these mushrooms contain a very high percentage of potassium salts, and of phosphoric acid, amounting to 46–49 per cent. of the ash. The following other fungi have also been examined:—

Boletus edulis: in 100 parts of dry substance, 22·82 of protein; 5·14 of mannite; 1·98 of fat. The ash contains 50·95 of potash, and 20·12 of phosphoric acid.

Cantharelles cibarius: 10·68 parts of protein; 23·43 of mannite; 1·38 of fat. The ash contains 48·75 parts of potash, and 31·32 of phosphoric acid.

Clavaria flava: 24·43 parts of protein; 4·81 of mannite; 12·13 of fat. The ash contains 51·47 of potash, and 35·07 of phosphoric acid.

Tuber cibarium: 36·32 parts of protein; 2·48 of fat. The ash contains 55·97 of potash, and 30·85 of phosphoric acid.

Agaricus campestris: 20·63 parts of protein; 1·75 of fat; 4·91 of mannite; 7·13 of fermentable sugar. The ash contains 50·71 of potash, but only 15·43 of phosphoric acid, much of the latter constituent being replaced by sulphuric acid.

It is highly probable that age and location promote variations even in the same species, not only as regards the percentage of protein, but also the composition of the ash. But these differences are so insignificant that they have no effect whatever upon the high rank which mushrooms occupy among nitrogenous foods. Kohlrausch compares the most usual of the latter in reference to their percentage of nitrogen, in the following tables:—

Protein-substance calculated for	Beef.	Veal.	Wheat Bread.	Oatmeal.	Barley Bread.	Leguminous Fruits.	Potatoes.	Mushrooms.
100 parts of dry substance.	38·69	44·05	8·03	9·74	6·39	27·05	4·85	33·0

This comparison shows that the statement made above, regarding the neglect of one of the most accessible and valuable articles of

food, is well supported. It is considered one of the greatest merits of Liebig, that he made the immense quantities of otherwise almost useless South American beef serviceable to man in the shape of extract. The nutritive and therapeutic value of this depends in a great measure upon its percentage of potash salts and of phosphoric acid; and a simple comparison will show that an equally valuable food may be prepared, in the form of extract, from mushrooms.

This extract, besides, can be prepared so as to retain the peculiar aroma of the mushroom, which is very pleasant for itself, and is even more highly valued as a piquant addition to meats in the form of catsup, while the Fray-Bentos extract possesses a flavour by no means agreeable to all consumers. It is true that some species of fungi, as *Boletus* (which are by far the most numerous and common), are almost devoid of this aroma, but they are at least free from any disagreeable twang, and, if proper care be exercised to avoid the poisonous ones, the labour of collecting and preparing an extract from them for culinary and therapeutic purposes would richly repay some enterprising pharmacist.

Distinction of Natural from Artificial Butter. (*Chem. and Drugg.*, 1878, 160.) The *Pharmaceutische Centralhalle*, December 6, 1877, after pointing out the unsatisfactory nature of the ordinary microscopical and chemical tests, indicates the following olfactory reactions as at once decisive and simple. An ordinary cotton wick is dipped in clarified melted butter, ignited, and after burning for two minutes, is extinguished. The vapour arising from the wick is then examined by sense of smell, when, in the case of artificial butter, the characteristic disagreeable odour of an extinguished tallow candle will be perceived; but in the case of natural butter, simply the well-known smell of fried butter. The other method is a little more complicated. Here one volume of melted butter is mixed in a glass retort with two volumes of a mixture consisting of one volume of concentrated sulphuric acid and two of spirits of wine. This is distilled by the flame of a spirit lamp; and a few drops of the distillate are rubbed on the hand. In the case of natural butter this produces an odour of butyric ether; in the case of artificial butter the repulsive smell of old tallow. The "P. C." remarks, by way of caution, that in both cases the melted butter must have been freed from all traces of casein.

Ammoniacal Tincture of Lupulin. (*New Remedies*, June, 1878, 176.) As neither water nor alcohol completely extract the active principles of lupulin, it has been proposed to apply aromatic spirits of ammonia as a menstruum. The tincture may be prepared by

using 56 grams of lupulin, macerating them in 473 grams of aromatic spirits of ammonia for seven days, frequently shaking; finally filtering, and making up the bulk of the tincture by washing the dregs with fresh menstruum until 473 grams of tincture are obtained. Or it may be better still to take lupulin one part, aromatic spirits of ammonia, q. s., and to percolate until five parts of tincture are obtained.

Chloride of Zinc Caustic. P. Carles. (*L'Union Pharmaceutique*, April, 1878, 100.) The preparation known as *Canquion's Caustic* (*Pate de Canquion*), which, according to the French Codex, is prepared by dissolving chloride of zinc in a small quantity of water, and adding, with continual trituration, an equal weight of flour, is open to the objection of being too hygroscopic. To remedy this defect the author proposes the following modification of this formula:—

Fused Zinc Chloride	10 parts.
Alcohol, 60 per cent.	2 ,,
Wheat Flour	15 ,,

Crush the chloride of zinc, rub it with alcohol, and corporate with it the flour by assiduous trituration. As soon as the paste is homogeneous, roll it out into a cake about one millimetre thick, and after a few hours place it in a flask.

Fuller's Tamarind Electuary. (*New Remedies*, May, 1878, 158.)

White Sugar	10 parts.
Manna	25 ,,
Boiling Water.	50 ,,
Dissolve and filter. When cold, add—	
Tamarind Pulp, purified . . .	15 parts
Potas. Bitartrate	1 ,,
Senna Leaves, powdered . . .	4 ,,

The finished product should weigh 100 parts.

Bossu's Laxative Mixture. (*Ibid.*)

Resin of Scammony,	
,, Jalap	āā ½ grain.
Croton Oil	2 drops.
Mucilage	25 grains.
White Sugar	15 grains.
Orange-flower Water	4 scruples.
Compound Syrup of Senna . .	1 fl. ounce.
Peppermint Water	3 fl. ounces.

The first five ingredients having been properly triturated together and emulsionized, the remainder is added carefully. Dose, one tablespoonful.

Action of Paraffin Oils on Metals. Dr. S. Macadam. (*Pharm. Journ.*, 3rd series, viii., 463.) Twelve series of experiments were made with the highest quality of burning oil and the metals. Lead was employed in three of the trials, because this metal is more liable to be acted upon when the surface is bright than when the surface possesses the ordinary skin or coating of oxide and carbonate, and the results obtained with bright lead might not apply to tarnished lead. This difference in action is well known in the case of the chemical influence of different natural waters upon lead.

1. *Bright Lead.*—When paraffin oil is brought in contact with scraped lead, where the surface is quite bright, the chemical action begins instantly, and a few moments are alone required to communicate the metal to the oil. In a day the action is so decided that the oil begins to present rather a cloudy appearance, owing to the presence of the lead compound; and on washing the oil with water, the latter on settling retains a milky appearance from the head compound, which is apparently a basic salt and has an alkalinl reaction on test papers.

2. *Tarnished Lead with unprotected edges.*—Lead cut into small sheets and placed in the paraffin oil without any protection to the fresh-cut edges, necessarily exposes a large surface of tarnished metal with the natural skin of oxycarbonate, and a comparatively small surface of bright metal, where the fresh-cut edges are visible. The investigation showed that under these circumstances the lead is not so readily acted on by the oil; but in a couple of days the oil gets impregnated with lead compound, and becomes unsuitable for illuminating purposes.

3. *Tarnished Lead with protected edges.*—In this case the lead was taken with its natural skin, and the fresh cut edges were protected by wax. Under these circumstances the paraffin oil acts even less energetically; and though traces of the metal may be found in the oil in an hour from the commencement of the experiment, yet it takes about a week before the oil becomes largely impregnated with the metal.

4. *Tin.*—This metal is very slightly acted upon by the oil, and in a month's time the amount of metal dissolved in and diffused through the oil is very small, and is not sufficient to impede the combustion of the oil in lamps.

5. *Copper.*—A very slight action is apparant after a month's exposure, and practically the oil is not affected thereby as a luminant.

6. *Iron* is slightly affected by the paraffin oil, and on ten days'

contact the oil becomes deeper in colour and throws down a fine ferruginous sediment. The oil itself is, however, not materially injured as an illuminating agent.

7. *Zinc.*—This metal is sensibly acted upon by the paraffin oil, and the latter retains the zinc compound in solution and suspension. The oil is decidedly injured as a luminant.

8. *Tin solder* of the best quality, containing two parts of tin and one part of lead, is acted upon by the paraffin oil, and the latter is injuriously affected as an illuminating agent.

9. *Tin soldered with tin solder* is also acted upon, and lead is dissolved out from the solder by the paraffin oil. The quantity of metal dissolved out is not large, but is sufficient to influence the oil as a luminant.

10. *Tinned copper* is not practically affected by the paraffin oil so far as the combustion of the oil is concerned, but traces of both the tin and the copper are found in the oil after a month's exposure.

11. *Tinned iron* is acted upon very slightly, but the oil does not suffer as an illuminating agent.

12. *Galvanized iron* is readily acted upon by the oil, and the quality of the oil for burning with wicks is sensibly injured.

These experimental observations demonstrate that the metals lead and zinc should not be employed in the construction of or in the lining of cisterns or other vessels intended for the storage or reception of paraffin oils; that the metals, tin, copper, and iron, as well as tinned copper and tinned iron, may be safely employed in the fabrication of the cisterns or other vessels, and that ordinary tin solder, containing lead, should not be used in the soldering of such cisterns or vessels. Galvanized iron should likewise be avoided. Whilst stating that the cisterns or vessels for the retention of paraffin oil may be safely constructed of or be lined with tin, copper, or iron, it would be preferable to use cisterns or vessels lined with enamel in the interior, provided such could be obtained of sufficient size for the purpose. The ordinary enamelled iron pots present absolutely no surface upon which the paraffin oil can act, and cisterns or vessels constructed in a similar way with an interior lining of enamel would retain the paraffin oil for any time without affecting in the slightest degree the purity of the oil or its entire suitability for illuminating purposes.

In cases where lead cisterns or vessels have been in use for the retention of the paraffin oil, there can be no doubt that the inferior illuminating power of the oil may be fairly attributed to the lead impregnation. The action is lessened much by washing over the

surface of the lead with dilute sulphuric acid, which forms a coating of the insoluble sulphate of lead, in or through which the paraffin oil has comparatively a feeble action. The oil, however, does take up a little lead, and hence the impurity still continues to pass to the wick. A better protective coating is obtained by brushing over the surface of the lead with solution of sulphuretted hydrogen, and still better with sulphide of ammonium, when a coating of insoluble sulphide of lead is formed, on or through which the paraffin oil has still less action than on or through the sulphate of lead. The impregnation of the oil, however, still goes on, though in a minimum degree.

Formulæ for Administering Butyl-Chloral Hydrate. (*Chicago Med. Journ. and Exam.*) This remedy seems to be a specific for pain in the branches of the fifth cranial nerve, and Friedinger (*Wiener Med. Woch.*) says that it can be relied upon to allay the fearful pains which attend inflammation of the iris and choroid, known as ciliary neuralgia. In all cases where it was given for the relief of this form of neuralgia, it exerted its anæsthetic effect without producing any collateral disturbances. This is his formula :—

℞	Butyl-chloral	1 gram.
	Spir. Vini rectif.	4 ,,
	Aquæ destillat.	150 ,,
	Syr. Aurant. cort.	15 ,,
M.	One tablespoonful every two hours.	

Dr. Livon (*La France Méd.*) employs the following formula for administering butyl-chloral by the stomach :—

℞	Butyl-chloral	2 grams.
	Glycerin (warm)	6 ,,
	Extract of Liquorice	4 ,,
	Water,	
	Syrup, ...	āā 45 ,,
M.		

For hypodermic injection, the same observer gives the following formula :—

℞	Butyl-chloral	1·60 gram.
	Glycerin,	
	Cherry Laurel Water . . .	āā 16· ,,
M.		

Each gram of the solution contains 5 centigrams. Divided doses of 5, 10, or 20 centigrams, repeated as required several times in succession, generally succeed in quieting pain. From 50 centigrams to 1 gram instantly relieve pain of considerable intensity ;

and for very severe pain the dose may be carried to 3, 4, or even more grams at once.

Soluble Saccharate of Iron. O. Ficinus. (*Archiv der Pharmacie*, Jan., 1878.) The preparation of this compound on the large scale is somewhat difficult, as the settling of the precipitate and its washing consume a great deal of time. The mixture of 1 part of solution of ferric chloride, 1 part of syrup, and 2 parts of solution of soda (sp. gr. 1330) instead of being poured into 15 parts of boiling hot water, as the Germ. Ph. directs, should be poured into a quantity of 90 per cent. alcohol, amounting to three times its bulk. The resinous-looking precipitate after the removal of supernatant liquid, should be repeatedly stirred up with alcohol, and finally dried with 9 parts of sugar; when dry, rubbed to powder with 10 more parts of sugar, and preserved in well-closed bottles. The alcohol, of course, can all be recovered by distillation.

Emulsiones Oleosæ. L. von Cotzhausen. (*Amer. Journ. Pharm.*, 1878, 284.) The experiments recorded in this paper comprise emulsions of cod liver oil, copaiba, castor oil, and oil of turpentine.

1. The Pharmacopœia Germanica orders emulsiones oleosæ to be made with 2 parts of oil, 1 of pulverized gum arabic, and 17 parts of water, unless otherwise directed by the physician. The author took ol. morrhuæ, f ʒiv.; pulv. gum acaciæ, ʒii.; aqu. dest., f ʒiv., poured the oil and water on the gum in a mortar, triturated them well for a few minutes, when a good emulsion was formed, and then added sufficient water to make f ℥v. This emulsion remains unchanged after keeping it six weeks at a constant temperature of 70° F.

2. He then reduced the quantity of water one-fourth, mixing at once—ol. morrhuæ, f ʒiv.; powd. gum arabic, ʒii.; aqu. dest., f ʒiii., and then diluted with the balance of water; the result was the same. This is the favourite method of most German apothecaries, and is considered by them better and surer to bring success than the first. He has made very many emulsions by it with various oils during a number of years, and never failed. Four emulsions containing 50 per cent. of cod liver oil, castor oil, turpentine, and copaiba respectively, made by the second method were kept for four weeks, after which they were as elegant in appearance as at the beginning, and showed no inclination of spoiling or separating, although they had been kept at a constant temperature of 70° F. Emulsions containing 50 per cent. of oil, made by the first method, likewise appeared unchanged for two weeks.

3. A large proportion of gum is not objectionable in most emulsions, as in copaiba emulsions, preventing the latter from having a too strong purgative effect; in others, however (as castor oil emulsion), care must be taken, as a large proportion of gum would counteract the effects of the oil to a certain extent. The quantity of gum arabic was therefore reduced one half of its former quantity, thus making the proportions: 4 parts oil, 1 part gum arabic, 3 parts water. Emulsions of cod liver oil, castor oil, copaiba, and oil of turpentine, made in this proportion, at first presented as elegant an appearance as those containing double the quantity of gum, and remained unchanged for three days, then the emulsion of copaiba began to separate into two layers, the lower one being only about one-fifth of the whole mixture; on being shaken they readily reunited, again forming, apparently, a perfect emulsion, which, however, began to separate again in the course of twenty-four hours. The emulsion of cod liver oil began to separate a little at the end of four days, that of castor oil after six weeks, the turpentine emulsion is still unchanged.

4. An attempt to reduce the amount of gum to one-fourth the original quantity, so as to bring the proportions: 8 parts oil, 6 parts water, and 1 part powdered gum arabic, proved successful with cod liver oil, turpentine and castor oil, but gave an unsatisfactory result with copaiba, even after considerable constant trituration. The emulsions of cod liver oil, turpentine, and castor oil separated on standing for twelve hours, not showing any separated oil globules floating on the top, but two distinct layers, the upper one of which still retained the appearance of a perfect emulsion, while the lower one was thinner and lighter in colour; shaking slightly again mixed them perfectly. This proves that ʒi. of gum arabic to the ounce of oil will answer satisfactorily when the emulsion is to be used in a short space of time.

5. An emulsion made by shaking together in a bottle equal parts of cod liver oil and of the officinal mucilage of gum arabic was a perfect success, not separating in the least. After standing for three weeks and two days, a separation into layers slowly commenced.

6. Cod liver oil, f ʒi., the yolk of one egg, and f ʒvi. of aq. dest. mixed intimately by trituration, yielded a yellowish white perfect emulsion, which could be diluted without separation, and remained unchanged for seven hours. It then separated into two layers, which reunited on shaking. Oil emulsions made by any of the above-mentioned processes will bear dilution with water and the addition of syrups or tinctures after being perfectly combined.

7. Parrish's formula for cod liver oil mixture reads as follows:—Take of cod liver oil, f ʒvi.; lime water, ʒix. To the lime water in a pint bottle add the oil, and shake, etc. The author mixed f ʒvi. of cod liver oil and f ʒix. of lime water, and after considerable incessant shaking obtained a very satisfactory emulsion, containing 40 per. cent. of cod liver oil, which remained unaltered for five days. It then commenced to separate into two layers, the upper one in this case consisting of a small amount of oil, while the lower one, which was at least $\frac{11}{12}$ths of the whole mixture, still appeared to be a perfect emulsion. But very little was required to reunite them.

8. Experiments made with different formulæ for "Emulsion of cod liver oil and lactophosphate of lime" gave the following results:—By following the directions of the formula published by Mr. Shinn (*Amer. Journ. Pharm.*, March, 1873, 135) a nicely flavoured emulsion was obtained. An attempt to mix the oil, water, and gum in his proportions by throwing them together into a mortar and triturating them well, proved equally successful; the emulsion in this case, however, separated after standing twenty-four hours, there being a narrow layer of oil visible floating on the top of the emulsion. Shaking in this case also reunited them.

Mr. Chiles' formula (*Amer. Journ. Pharm.*, March, 1873, 104) also deserves mention, furnishing, if properly adhered to, a very satisfactory result. There is another formula for this preparation, which seems to be preferred by many physicians. It is pleasant, acceptable to the most delicate stomach, and will not separate if properly made.

The recipe is as follows:—

℞	Ol. Morrhuæ	f ʒiv.
	Pulv. Sacchari albi,	
	,, Gum Acaciæ	āā ʒss.
	Ol. Gaultheriæ	gtt xxvi.
	,, Menth. Pip	gtt. vi.
	Aq. Dest.	f ʒiv.
Misce, fiat emulsio, cui adde		
	Syr. Lactophosphatis Calcii	f ʒii.

Mix the essential oils with cod liver oil; make a thick mucilage with gum, sugar, and a small quantity of distilled water; gradually and with constant trituration add the oil and the balance of water alternately. The syrup of lactophosphate of lime is best kept in a separate bottle, and added in the proper proportion before dispensing. This emulsion can be flavoured differently, of course, by substituting oil of bitter almonds, or any other desirable flavour, for the

oils of winter green and peppermint. The syrup of lactophosphate of lime is made according to the formula published by Mr. Chiles (*Amer. Journ. Pharm.*, 1873, 105), and seems very satisfactory.

9. A preparation prescribed much lately is "Emulsion of cod liver oil with hypophosphites." It can be easily made by substituting the proper syrup in the formula given above.

Mistura Guaiaci Composita, a Remedy for Quinsy. (*Med. and Surg. Reporter*, 1878, 1099.) The following formula is recommended in quinsy by R. J. Fritzinger :—

℞	Potassii Chloratis	ʒi.
	Spts. Ætheris Nitr.	ʒiv.
	Tr. Guaiaci,	
	Syr. Aurant. cort.	āāʒvi.

M. Sig. A teaspoonful every two hours in water. A tablespoonful, or just so much water as will allow the warming and astringent effect of the guaiac to be felt in the act of swallowing, should be used, and the swallowing should be done slowly. If the bowels move too freely, the dose may be diminished.

Eucalyptus Elixir. (From *Chem. and Drugg.*, December, 1877.) The following is the specification of a French patent for a new eucalyptus liquer invented by M. Rantieu :—Infuse for a fortnight 400 grams of leaves of *Eucalyptus globulus* in 1000 c.c. alcohol 96°. In another 1000 c.c. 95° infuse for a fortnight the following: balm, 6 grams; angelica, hyssop, English peppermint, and canella, of each 2 grams; nutmeg, clove, and vanilla, of each 1 gram. Thirdly, make a syrup with sugar, 1 kil.; water, 1·125 gram. Add to the cold syrup 800 grams of infusion No. 2, and a few days later filter. Then add 300 grams of No. 1 infusion, and after skimming filter again and bottle.

Formulæ for Elixirs. (*New Remedies*, June, 1878.)

Simple Elixir.

℞	Spirit of Orange (1 in 10) . . .	2 fl. scruples.
	„ „ Cinnamon (1 in 10) .	10 min.
	Alcohol	4 fl. oz.
	Syrup	6 fl. oz.
	Water	6 fl. oz.

Dissolve the spirits in the alcohol, gradually add the water, rub a portion of the solution to a smooth thin paste, with precipitated chalk, and then incorporate the rest of the solution with it; transfer the mixture to a well wetted plaited filter, which should be filled full, so that the chalk may help to stop up the larger pores of the

filter; return the first portions until the filtrate runs off clear; wash the chalk on the filter with enough water to make the filtrate measure 10 fl. oz.; then add to it the syrup. The chalk should be gently dried on the filter, and utilized with a fresh quantity of elixir.

Elixir of Quinia and Iron.

℞	Citrate of Iron and Quinia (soluble) .	256 grains.
	Water	1 fl. oz.
	Simple Elixir	15 fl. oz.

Dissolve and mix. One teaspoonful contains 2 grains of citrate of iron and quinia.

Elixir of Calisaya and Bismuth.

℞	Ammonio-Citrate of Bismuth . .	256 grains.
	Fluid Extract of Cinchona . .	3 fl. oz.
	Simple Elixir	13 fl. oz.

Dissolve the ammonio-citrate of bismuth in the simple elixir, adding, if necessary, a few drops of ammonia to facilitate solution; then add the fluid extract, and filter.

Elixir of Valerianate of Ammonium.

℞	Ammonium Valerianate . . .	256 grains.
	Simple Elixir	16 fl. oz.

Dissolve and mix. Each teaspoonful contains 2 grains of the salt.

It is customary te colour this elixir. For this purpose a sufficient quantity of tincture of cochineal may be used; a much preferable colouring matter, however, is furnished by the berries of *Vaccinium Myrtillus*, which is highly recommended for this purpose.

Elixir of Pepsin and Bismuth.

A formula for this elixir is given, but not recommended. In the author's opinion pepsin should not be administered in such a combination, as it is partly precipitated, and probably rendered entirely inert. However, the following has been much used:—

℞	Ammonio-Citrate of Bismuth . .	256 grains.
	Saccharated Pepsin	256 ,,
	Spirit of Orange	½ fl. oz.
	Syrup	6 fl. oz.
	Sherry Wine	16 fl. oz.

Ammonio-citrate of bismuth is decomposed in an *acid* solution, while pepsin requires an acid to make it active; hence, on theoretical

grounds alone, the constituents of the above preparation seem to be incompatible.

Citrate of Iron, Quinia, and Strychnia.

℞		
	Citrate of Iron and Quinia (soluble)	256 grains.
	Citrate of Iron and Strychnia (1 per cent.)	128 grains.
	Water, warm	1 fl. oz.
	Simple Elixir	15 fl. oz.

Dissolve and mix. Citrate of iron and strychnia, of the U. S. Ph. of 1870, contains only 1 per cent. of strychnia, while that of the U. S. Ph. of 1860 contained 2 per cent. One teaspoonful of the above elixir contains 2 grains of citrate of iron and quinia and 1 grain of citrate of iron and strychnia; or about $\frac{1}{100}$th of a grain of strychnia citrate.

Elixir of Calisaya.

℞		
	Fluid Extract of Cinchona	3 fl. oz.
	Simple Elixir	13 fl. oz.

In this condition this elixir should not be mixed with preparations of iron, as it would become dark coloured. To facilitate its filtration, it may advantageously be made by mixing the fluid extract with all the ingredients for the simple elixir, except the syrup, filtering through paper, and then adding the syrup.

Elixir of Gentian and Iron.

℞		
	Pyrophosphate of Iron	256 grains.
	Fluid Extract of Gentian	1 fl. oz.
	Simple Elixir	15 fl. oz.

Dissolve the pyrophosphate of iron in the simple elixir; then add the fluid extract. It will, however, be found to be more convenient to make this elixir by the following formula :—

℞		
	Pyrophosphate of Iron	256 grains.
	Fuid Extract of Gentian	1 fl. oz.
	Water	7 fl. oz.
	Spirit of Orange (1 in 10)	2 fl. ʒ.
	,, Cinnamon (1 in 10)	10 min.
	Alcohol	5 fl. oz.
	Syrup	q.s. ad. 16 fl. oz.

Dissolve the pyrophosphate of iron in the water; dissolve the spirits in the alcohol; mix the two solutions and add the fluid extract. Then filter, and finally add the syrup.

Elixir of Chloral Hydrate.

℞	Chloral Hydrate, crystallized . .	640 grains.
	Simple Elixir	16 fl. oz.

Dissolve and mix. Each teaspoonful contains five grains of chloral hydrate.

Elixir of Beef, Iron, and Wine.

℞	Extract of Beef (Liebig's) . .	½ troy oz.
	Ammonio-Citrate of Iron . . .	256 grains.
	Spirit of Orange (1 in 10) . . .	½ fl. oz.
	,, Anise (1 in 10) . . .	1 fl. oz.
	Water	1½ fluid oz.
	Syrup	6 fl. oz.
	Sherry Wine	q. s. ad. 16 fl. oz.

Dissolve the ammonio-citrate of iron in the water; rub the extract of beef with the sherry wine, gradually added, until it is apparently dissolved; then add the spirits. Let the whole stand in a *cold* place for at least forty-eight hours; then filter.

Phosphide of Tin. S. Natanson and G. Vortman. (*Ber. der deutsch. chem.-Ges.*, 1877, 1459–1461). This substance is at present an article of commerce, and is technically employed in place of phosphide of copper for the preparation of phosphor-bronze. The authors prepared it (1), by heating a mixture of 3 parts glacial phosphoric acid with 1 part charcoal and 6 parts of tin; (2) by fusing glacial phosphoric acid with tin; (3) by passing phosphorous vapours over tin fused in a current of hydrogen (Vigier's method, 1861); and (4) by throwing phosphorus upon fused tin (Pelletier and Langrebe's process, 1829). The products were silvery white and foliaceous, contained between 96 and 98 per cent. of tin, and were soluble in muriatic acid, with the evolution of phosphoretted hydrogen. If heated with nitric acid for a short time, then just sufficient muriatic acid to dissolve the stannic acid, and again heated for some time, yellowish scales of a metallic lustre are left, which contain 75 per cent. of tin, and when boiled with caustic potassa yield a brown-yellow solution and silvery scales, containing 79·53 per cent. of tin. The formula Sn P requires 78·89 per cent.

Distinction of Wool and Cotton. E. Liebermann. (*Pharmaceut. Centralhalle*, 1877, No. 40.) The cloth to be tested is immersed in an ammoniacal solution of füchsine, then washed with water and dried by exposure to air. The cotton threads will appear uncoloured, while the wool will show a red tint.

To Silver Iron. (From *Chem. and Drugg.*, Dec., 1877.) To silver

cast iron 15 grains of nitrate of silver are dissolved in 250 grains of water, and 30 grains cyanide of potassium are added; when the solution is complete, the liquid is poured into 700 grains of water, wherein 15 grains of common salt have been previously dissolved. The cast iron intended to be silvered by this solution should, after having been well cleaned, be placed for a few minutes in a bath of nitric acid of 1·2 sp. gr. just before being placed in the silvering fluid.

Administration of Digitalis. (*British Med. Journ.*, April 27, 1878.) A very interesting discussion lately took place at a meeting of the Société Thérapeutique, on the therapeutic influence and mode of administration of digitalis in disease. Most of the speakers gave the preference to a cold infusion of the leaves over any other preparation, and were almost unanimous in condemning digitalin as being dangerous and unreliable, as it does not possess the diuretic properties contained in the leaves. Dr. Héraud, who brought the subject to notice, recommends the following preparation: Macerate for twelve hours 25 centigrams of the powdered leaves of digitalis in 200 grams of cold water. This is then strained, and the patient is directed to take it in five or six doses, in the twenty-four hours, at some distance from meals. This dose, he says, should never be exceeded, if we wish to avoid its poisonous effects; and the quantity he prescribes is quite sufficient to produce the full therapeutic action of the drug, beyond which it is needless to push it. Dr. Héraud considers digitalis one of the best diuretics known in affections of the heart; whereas it is useless where there is no cardiac lesion, as, for instance, in cirrhosis, albuminuria, etc.

Sapo Viridis. H. Betz. (*Amer. Journ. Pharm.*, from *Petersl. Med. Wochenschr.*, 1877, No. 20.) This preparation is used to some extent in Europe, and many pharmacists are obliged to keep it for their customers, who make use of it in itch and allied affections, for which it is by some considered quite an efficacious remedy.

As found in the market it is often very impure, being prepared from common animal fats and coloured with various substances. Animal fats are not advisable for this purpose, but any vegetable fatty oil, such as oil of hemp or linseed, can be very properly used. In countries where oil of hempseed is a common article of commerce, green soap is usually made from this oil, and is obtained of a nice dark green colour.

One reason why green soap in this country is so often adulterated may be found in the scarcity and high price of oil of hempseed. Oil of linseed has the same properties in making a soap for the pur-

pose before mentioned, and on account of its cheapness would not offer so much temptation for adulteration; it would be advisable to use it altogether, when a uniform and reliable preparation could always be obtained. As it is now, hardly two samples can be found alike.

In making green soap one or two points have to be taken into consideration. In the first place, the colour. This green colour is one of the most difficult to be obtain from vegetables. After a number of experiments, the author found none to answer so well as the green colouring matter precipitated from a solution of indigo by lime.

Another point is the disagreeable odour which green soap usually has; but this is easily overcome by a few drops of essential oil, for instance, the oil of citronella.

The following formula may be found useful in preparing the soap:—

℞ Oil of Linseed, U. S. P.,
Solution of Potash . . . . . āā Oi.
Colouring matter . . . . . q. s.
Oil of Citronella . . . . . gtts. x.

Place the oil and potash in a porcelain dish; mix thoroughly, and boil with a regulated heat until the mass becomes thick or stringy; then add the colouring matter and the oil of citronella with constant stirring.

If the oil is perfectly saponified, the mass must be homogeneous and transparent; opacity may be due to a want of water, or to an excess of fat, or of solution of potash. The first and last can be remedied by a small quantity of water, and if the proportion of oil was too large, an addition of solution of potash will render the mixture clear.

Iodide of Ethyl or Hydriodic Ether. G. Sée. (*Répert. de Pharm.*, vi., 97; *Pharm. Journ.*, 3rd series, viii., 853.) The author has observed remarkable effects in asthma from inhalations of iodide of ethyl.

In preparing iodide of ethyl according to Wurtz's method, 25 parts of alcohol are introduced together with 7 parts of phosphorus into a flask; to the neck of the flask is fitted a prolongation nearly filled with iodine and coarse fragments of glass; the orifice of the prolongation is closed by a cork, through which passes one end of a glass tube, the remainder of which, after a slight curve, is enveloped in a Liebig's condenser. The flask is heated in a water bath, and upon distillation of the alcohol the vapour after condensation flows

back into the prolongation, where it dissolves iodine before falling into the flask. There under the influence of the iodine and the phosphorus the alcohol is decomposed, iodide of ethyl being formed, and an oxygen compound of phosphorus. When the whole of the iodine has been dissolved, as indicated by the condensed liquor falling into the bottle colourless, the operation is stopped and the product in the flask separated from any excess of phosphorus for purification. The precautions necessary during the operation are to regulate the heat so as to produce a gentle ebullition, and to use a relatively capacious vessel.

M. Personne substitutes amorphous for ordinary phosphorus, using 30 parts of phosphorus, 120 parts of absolute alcohol, and 100 parts of iodine. The phosphorus and alcohol are placed first in a tubulated retort, next the iodine in two successive portions at a minute's interval; the mixture is then distilled and condensed. In this way, according to Personne, a kilogram of hydriodic ether may be obtained without danger in less than an hour.

Prepared by either method the product requires to be purified before use in medicine. This is done by redistilling it over a water bath, shaking the distillate with water and then with an alkaline solution, dehydrating it over calcium chloride, and submitting it to final rectification.

At present iodide of ethyl is only administered in inhalations, 6 to 10 drops being used six or eight times a day against attacks of asthma.

A New Adhesive Plaster. (*Pharm. Journ.*, 3rd series, viii., 502.) Dr. Martin writes to the *Boston Med. and Surg. Journ.* that he has invented a new kind of plaster, which is expected to supersede ordinary sticking plaster. It is formed by mixing Para caoutchouc and Burgundy pitch with a small proportion of balsam of tolu. This mixture is spread upon strongly woven cloth. A sticking plaster which will not cause irritation, which will adhere well, and which will perform its guarantee, "not to wash off," is certainly a desideratum; and if this method succeeds, it will doubtless be rewarded with commercial success. The Japanese have already solved the difficulty by the very simple plan of spreading bird-lime on paper, or cloth, or silk, and applying it to wounds or cuts, which it is stated to heal rapidly. It may not be generally known that bird-lime can be dried and powdered, and will regain its properties when moistened. The properties of this substance certainly deserve examination from a surgical point of view, and its portability and easy application might permit of its forming a portion of the kit of every soldier, and

its use might, to some extent, prevent such harrowing scenes as have been described as occurring in the Turkish war, when doctors have not been procurable for several days together.

Formulæ for Perfumes. (*New Remedies*, June, 1878, 190.)

Eau de Millefleurs (Dr. Bering).

Oil of Neroli	50 drops.
,, Rose	80 ,,
,, Lavender	18·7 grams.
,, Cinnamon	18·7 ,,
,, Cloves	37·5 ,,
,, Lemon	56 ,,
,, Bergamot	75 ,,
Musk	1 ,,
Vanilla	3 ,,
Cologne Spirits	1800 ,,

Digest fourteen days and filter.

Eau de Portugal (Dr. Bering).

Oil of Rose	10 grams.
,, Lemon	50 ,,
,, Bergamot	50 ,,
,, Portugal	100 ,,
Cologne Spirits	3 litres.

Eau de Liegnitz (Dr. Bering).

Oil of Cinnamon	30 grams.
,, Cloves	30 ,,
,, Rose	10 ,,
,, Lavender	20 ,,
,, Neroli	40 ,,
,, Lemon	60 ,,
,, Bergamot	80 ,,
Balsam of Peru	120 ,,
Tincture of Benzoin	240 ,,
Ambergris	3·3 ,,
Musk	1 ,,
Cologne Spirits	3 litres.

Eau de Lavande.

The following formula, communicated by Dr. Bering of Bromberg, is said to yield a superior product:—

Ceylon Cinnamon	125 grams.
Cloves	250 ,,
Florentine Orris Root	500 ,,
Grains d'Ambrette	500 ,,
Orange Peel, fresh	125 ,,
Coriander	125 ,,
Musk	1–1·5 ,,

are digested for eight days with 23½ litres of Cologne spirits, with frequent agitation. The liquid is then filtered, and to the filtrate is added—

Balsam of Peru	120 grams.
Oil of Lavender, finest	375 ,,
,, Bergamot	250 ,,
Musk	1·5 ,,
Orange-flower Water (triple)	45 ,,
Rose Water	45 ,,

The whole is to be left standing for at least three months, then to be filtered and bottled.

Another Formula.

Oil of Bergamot	250 grams.
,, Lemon	125 ,,
Balsam of Peru	125 ,,
Oil of Lavender, finest	63 ,,
,, Cloves	63 ,,
Cologne Spirits	5 litres.

Warren's Styptic Balsam. (*New Remedies*, 1878, 44.) The original formula was published by Dr. James Warren, of Boston, in the *New York Journal of Medicine*, and reads as follows:—

℞	Acid Sulphurici	(by weight) ʒv.
	Spirits Terebinthinæ,	
	Spirits Vini rectif.	āā fl. ʒii.

Place the acid in a wedgewood mortar and add the turpentine slowly, stirring it constantly with the pestle; then add the alcohol in the same manner, and continue stirring it until no more fumes arise, when it may be bottled, and should be stoppered with a ground-glass stopper. None but the purest materials must be used, and when done it should exhibit a dark but clear red colour, like dark blood; but if it be a pale, dirty red, it will be unfit for use. The dose is forty drops, and the method of using it is as follows:—Put a teaspoonful of brown sugar in a teacup, and rub in forty drops of the balsam until thoroughly incorporated, and then slowly stir in water until the cup is nearly full, when it should be immediately swallowed. This dose may be repeated at intervals of an hour, until three or four doses have been taken, if necessary; but its use should be discontinued when fresh blood ceases to flow. After standing a few days a pellicle forms upon the surface of the balsam, which should be broken and the liquid below it used. It does not deteriorate by age if tightly stoppered.

The "balsam" is recommended to be used in hemoptysis, hematemesis, epistaxis, and menorrhagia, and some of our correspondents say that it has proved very serviceable in their hands.

Indestructible Ink. (*Chem. and Drugg.*, 1877, 497.) An ink that cannot be erased, even with acids, is obtained by the following receipt:—To good gall ink add a strong solution of fine soluble Prussian blue in distilled water. This addition makes the ink, which was previously proof against alkalies, equally proof against acids, and forms a writing fluid which cannot be erased without destruction of the paper. The ink writes generally greenish blue, but afterwards turns black.

Formula for Copying Ink. (*Ibid.*, from *Le Moniteur des Products Chimiques.*) Professor Gintl proposes the following:—A concentrated solution of logwood is treated, first, with one per cent. of alum, and then with the same proportion of lime water, until a permanent precipitate is formed. A few drops of a weak solution of chloride of calcium are added until a bluish black colour is obtained, then hydrochloric acid is added drop by drop until the liquid turns red. A little gum and about one per cent. of glycerin are then added, and the ink is ready for use.

Reaction of Chloral Hydrate with Sulphuretted Hydrogen. J. Kleinert. (*Pharmaceut. Centralhalle*, 1878, 20.) Chloral hydrate, when dissolved in water impregnated with sulphuretted hydrogen, yields a solution which on the addition of ammonium hydrate turns yellow, and then gradually changes to brownish red.

TRANSACTIONS

OF THE

British Pharmaceutical Conference

AT THE

FIFTEENTH ANNUAL MEETING

AT

DUBLIN,

1878.

EDITED BY

PROFESSOR ATTFIELD.

CONTENTS.

British Pharmaceutical Conference.

CONSTITUTION.

Art. I. This Association shall be called The British Pharmaceutical Conference, and it objects shall be the following:—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.
2. The subscription shall be 7*s.* 6*d.* annually, which shall be due in advance upon July 1.
3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.
4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.
5. The Officers of the Conference shall be a President, four Vice-presidents by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.
6. At each Conference, it shall be determined at what place and time to hold that of the next year.
7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.
8. The Executive Committee shall present a report of proceedings annually.
9. These rates shall not be altered except at an annual meeting of the members.
10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

*** *Authors are specially requested to send the titles of their Papers to either of the General Secretaries two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.*

FORM OF NOMINATION.

I Nominate

Name) .....

(*Address*) .....

as a Member of the British Pharmaceutical Conference.

..... *Member*

Date .....

This or any similar form must be filled up legibly, and forwarded to one of the Honorary General Secretaries, Prof. Attfield, 17, Bloomsbury Square, W.C., or F. Baden Benger, F.C.S., 7, Exchange Street, Manchester, either of whom, or any other officer or member, will duly sign the paper.

Pupils and Assistants, as well as Principals are invited to become members.

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Wiltshire, T. P., F.C.S., Room 8, 271, Broadway, New York.
Wood, Prof. C. H., F.I.C., F.C.S., Government Cinchona Plantations, Rungbee, near Darjeeling and Calcutta, India (Year Book and Letters care of Mr. Baldock, 3, High Street, S. Norwood, S.E.).
Woolcott, Mr. H. W., Paramatta, N.S.W. (Year-Book care of Mr. N. Weekes, 105, George Street, Sydney, N.S.W.).
Woolnough, Mr. H. A., Hong-Kong Dispensary, Hong-Kong (Letters to St. George's Middle Street, Norwich).
Zambeletti, Sig. L., 5, Piazza San Carlo, Milan, Italy.

NOTICE.

Members will please report any inaccuracies in these lists to

PROFESSOR ATTFIELD, *Hon. Gen. Sec.*,
17, *Bloomsbury Square*,
London, *W.C.*

LIST OF MEMBERS.

For Alphabetical List of Towns, see page 437.

Abbott, Mr. J., 145, Woodhouse Lane, Leeds.
Abraham, Mr. J., 87, Bold Street, Liverpool.
Abraham, Mr. T. F., 87, Bold Street, Liverpool.
Abram, Mr. F. W., Market Place, East Dereham, Norfolk.
Ackerman, Mr. T., 39, Redcliff Hill, Bristol.
Adam, Mr. T., 440, St. Vincent Street, Glasgow.
Adams, Mr. A. A., Woolston, Southampton.
Adams, Mr. F., Stoke-on-Trent.
Adams, Mr. R. W., Park Place, Dover.
Adlington, Mr. W. B., 6, Weymouth Street, Portland Place, W.
Agar, Mr. W., Westgate, Mansfield.
Ainslie, Mr. W., 58, George Street, Edinburgh.
Aitken, Mr. J., 44, Broughton Street, Edinburgh.
Aitken, Mr. R., 73, Princes Street, Edinburgh.
Alcock, Mr. H., Market Street, Tunstall, Staffs.
Alexander, Mr. J., 81, Athol Street, Liverpool.
Allanson, Mr. C., Montpelier Parade, Low Harrogate.
Allatt, Mr. F. T., Frizington.
Allchin, Mr. A., England House, Primrose Hill Road, N.W.
Allen, A. H., F.I.C., F.C.S., 1, Surrey Street, Sheffield.
Allen, C. A., M.D., M.R.C.S., 52, South Richmond Street, Dublin.
Allen, Mr. W., 48, Henry Street, Dublin.
Allen, Mr. W., Junr., 48, Henry Street, Dublin.
Allen, Mr. W. H., No address.
Allen, Mr. W. H., 3, Liverpool Terrace, Canning Town, Essex.
Allis, Mr. F., 137, High Street, Tewkesbury.
Allison, Mr. E., 13, Blanket Row, Hull.
Amoore, Mr. A. S., 173, Sloane Street, S.W.
Amos, Mr. D., 1, Parade, Canterbury.
Amyot, T. E., F.R.C.S., Diss.
Anderson, Mr. A. B., 38, Princes Street, Dundee.
Anderson, Mr. D. S., Forfar, N.B.
Anderson, Mr. E. H., Denny, Stirlingshire.
Anderson, Mr. H. D., Park House, Guernsey.
Andrews, Mr. F., 34, Leinster Terrace, W.
Anholm, Dr. A., 11, Smeaton Street, Hull.
Appleby, Mr. C., Market Place, East Retford.
Appleby, Mr. E. J., 8, Argyle Street, Bath.
Applegate, Mr. E., 5, Hercules Terrace, Holloway Road, N.
Appleyard, Mr. R., 50, Park Lane, Bradford.
Arblaster, Mr. C. J., 40A, New Street, Birmingham.
Archbold, Dr. G., Address unknown.
Archer, Mr. A., Ridgeway, near Chesterfield.
Archer, Mr. J., Lechlade, Gloucestershire.
Archer, Mr. J. S., Guiseley, Leeds.
Archer, Prof. T. C., Museum of Science and Art, Edinburgh.
Archibald, Mr. G. T., 56, Low Church Street, Workington.
Armitage, Mr. G., 30, Hamilton Street, Greenock, N.B.
Armstrong, Prof., H.E., F.R.S., London Institution, Finsbury Circus, E.C.
Armstrong, Mr. J., Kirkby Stephen, Westmoreland.
Arnold, Mr. S., 42, Mount Ephraim, Tunbridge Wells.

Arnold, Mr. A., Commercial Arcade, Guernsey.
Arundel, Mr. M. H., 9, Mildmay Park, N.
Ashton, Mr. W., 36, Sloane Square, Chelsea, S.W.
Ashton, Mr. W., 77, Lord Street, Southport, Lancashire.
Ashworth, Mr. T., Brierfield-in-little-Marsden, near Burnley, Lancs.
Asquith, Mr. W. C., Market Street, Colne.
Astin, Mr. E., 114, Abbey Street, Accrington.
Astley, Mr. J., 4, Broadgate, Coventry.
Atherton, J. H., F.C.S., Nottingham.
Atkins, Mr. S. R., Market Place, Salisbury.
Atkins, Mr. T. W., High Street, Poole, Dorset.
Atkins, Mr. W. R., The Mount, Elm Grove, Salisbury.
Atkins, Mr. W. S., 106, Broad Street, Birmingham.
Atkinson, Mr. J., Tynemouth, Northumberland.
Atkinson, Mr. L., 121, Greenwich Road, S.E.
Atmore, Mr. G., High Street, King's Lynn, Norfolk.
Attfield, Prof. J., Ph.D., F.I.C., F.C.S., 17, Bloomsbury Square, W.C.
Attwood, Mr. A., 147, Cannon Street, E.C.
Ault, Mr. J., Eastwood, Notts.
Austin, Mr. H. F., 126, Bermondsey Street, S.E.

Babtie, Mr. J., Dumbarton.
Backhouse, Mr. H. N., 76, New Bond Street, W.
Bagnall, Mr. W. H., 7, New Street, Lancaster.
Bagshaw, Mr. W., 37, Terrace Buildings, Yorkshire Street, Oldham.
Baigent, Mr. W. H., Clifton Road, Shefford, Beds.
Baildon, Mr. H. B., 73, Princes Street, Edinburgh.
Baildon, Mr. H. C., 73, Princes Street, Edinburgh.
Bailey, Mr. J. B., 9, Coley Hill, Reading.
Bailey, Mr. J. H., 3, Mornington Terrace, Wanstead, E.
Bailey, Mr. J. T., Thornton, near Bradford.
Bailey, Mr. W., Horseley Fields Chemical Works, Wolverhampton.
Baily, Mr. J., 44, Hampstead Hill Gardens, Hampstead, N.W.
Baine, Mr. J. A., 9, West Blackhall Street, Greenock.
Baker, Mr. C. P., High Street, Chelmsford.
Baker, Mr. F., Harnet Street, Sandwich.
Baker, Mr. G., High Street, Cosham, Hants.
Baker, Mr. P. C., Magdalen Street, Norwich.
Baker, W., F.I.C., F.C.S., 46, High Street, Sheffield.
Balch, Mr. E., 25, Queen Street, Ramsgate.
Balchin, Mr. E. S., 135, Penton Place, Newington Butts, S.E.
Balcomb, Mr. J., 10, Suffolk Parade, Cheltenham.
Baldock, J. H., F.L.S., F.C.S., 3, High Street, South Norwood, S.E.
Balkwill, Mr. A. P., 106, Old Town Street, Plymouth.
Ball, A., M.R.C.S., St. Leonards, York.
Ball, Mr. E., 1, Spring Gardens, Buxton.
Ball, T., L.R.C.P.E., L.S.A., 21, Donegall Place, Belfast.
Ball, Mr. W., 65, Russell Street, Landport.
Balls, Mr. G., 189, High Street, Deptford, S.E.
Baly, Mr. J., 40, High Street, Warwick.
Bamford, Mr. J. W., 37, Cronkeyshaw Road, Rochdale.
Bancks, Mr. A., Guisbro', Yorks.
Bannister, R., F.I.C , F.C.S., Laboratory, Somerset House, W.C.
Bannister, Mr. W., 108, Patrick Street, Cork.
Barber, Mr. G., 27, Botanic Road, Liverpool.
Barclay, Mr. T., 17, Bull Street, Birmingham.
Barker, Mr. C. D., West Park Corner, White Ladies' Road, Clifton, Bristol.
Barker, Mr. R., 2, Meadow Place, Mold, Flint.
Barker, Mr. W. R., 143, New Bond Street, W.
Barnard, Mr. J., 338, Oxford Street, W.

Barnes, Mr. B., 57, St. Peter's Street, Derby.
Barnes, J. B., F.C.S., 1, Trevor Terrace, Princes Gate, W.
Barnett, Mr. A., 5, The Colonnade, Buxton, Derbyshire.
Barnitt, Mr. F., Old Bond Street, Bath.
Barnitt, Mr. J., 86, The Parade, Leamington.
Barr, Mr. R., Gourock, N.B.
Barraclough, Mr. T., Roscoe Terrace, Chapeltown Road, Leeds.
Barret, E. L., B.Sc., F.I.C., 53, Springfield Road, St. John's Wood, N.W.
Barrett, F. J., F.C.S., Messrs. Wyley's & Co., Coventry.
Barrett, Mr. T. G., Church Street, Ilchester.
Barron, Mr. F., 117, Bush Lane, E.C.
Barron, Mr. W., 37, Winchcomb Street, Cheltenham.
Bartle, Mr. W. F., 47, Blackfriars Road, S.E.
Barton, Mr. A., Campbeltown, Argyleshire.
Barton, Mr. A. F. G., 115, Edge Lane, Liverpool.
Barton, Mr. H. E., High Street, Kenilworth.
Barton, Mr. H., 77, King's Road, Brighton.
Barton, Mr. S. W., Nevill Street, Southport.
Bascombe, Mr. F., 172, New Bond Street, W.
Bassett, Mr. C., Taff Street, Pontypridd.
Batchelor, Mr. A. E., 90, West Street, Fareham, Hants.
Bateman, Mr. T. H., 5, The Pavement, Forest Hill, S.E.
Bates, Mr. J., 214, High Street, Deritend, Birmingham.
Bates, Mr. J., Wellington, Salop.
Bates, Mr. W. I., 116, Mill Street, Macclesfield.
Bateson, Mr. T., 23, Stricklandgate, Kendal.
Bathe, Mr. R. S., 7, Lower Terrace, Notting Hill, W.
Bathgate, Mr. W. L., 23, Canning Place, Liverpool.
Battersby, Mr. S., Cheapside, Lancaster.
Batting, Mr. T. G., 98, The New Parade, Calverley Road, Tunbridge Wells.
Baxter, Mr. G., 13, Foregate Street, Chester.
Bayley, Mr. G. H., 12, Victoria Road, Saltaire, near Leeds.
Bayley, Mr. J. T., Brownhills, near Walsall.
Baynes, J., F.I.C., F.C.S., Laboratory, Royal Chambers, Scale Lane, Hull.
Beach, Mr. J., Bridport.
Beal, Mr. E. J., Ilford.
Beamish, Mr. G. P., Ditchley, Little Island, Cork.
Beanland, Mr. S., 11, Arctic Parade, Great Horton, Bradford, Yorks.
Beatty, Mr. J., Ballymena, Ireland.
Beaumont, Mr. C. F. J. B., 1, High Street, Chislehurst, S.E.
Beetham, Mr. M., 7, Promenade Villas, Cheltenham.
Beggs, Mr. G. D., Winton House, Dalkey, Ireland.
Belfield, Mr. W., 267, Stamford Street, Ashton-under-Lyne.
Bell, Mr. C. B., 6, Spring Bank, Hull.
Bell, Mr. F., 36, Tyrrel Street, Bradford.
Bell, Mr. F. E., Tow Law.
Bell, Mr. F. R., New Beckenham, Norfolk.
Bell, Mr. T., Ambleside.
Bell, Mr. W. H., 23, Colliergate, York.
Bell, Mr. W. H., 96, Albany Street, N.W.
Bellamy, Mr. R., Bedale.
Bellerby, Mr. M., 25, Shield Street, Newcastle-on-Tyne.
Benger, F. B., F.C.S., 7, Exchange Street, Manchester.
Bennet, Mr. J. D., Address unknown.
Bennett, Mr. G., 10, Bridge Street, York.
Bennett, Mr. H., 112, Upper George Street, Kingstown.
Bennett, Mr. J., 14, Waterloo Road, Widnes, near Warrington.
Bennett, Mr. R., 3, King Street, Sheffield.
Bennett, Mr. S , Tunstall, North Staffs.
Benson, J. L., Ph.D., Salthouse Lane, Hull.

Bentley, Prof. R., F.L.S., 17, Bloomsbury Square, W.C.
Bernays, Dr. A. J., F.C.S., St. Thomas's Hospital, S.E.
Berry, Mr. E., The Cross, Gloucester.
Berry, Mr. T., 189, Henshaw Street, Oldham.
Berry, Mr. W., 15, Albert Villas, Cotham, Bristol.
Best, T. F., F.C.S., 66, Aldersgate Street, E.C.
Betty, Mr. S. C., 1, Park Street, Camden Town, N.W.
Bevan, Mr. C. F., Church Street, Harwich.
Bibbings, Mr. J. H., Aqua Villa, Manning's Hill, Newton Abbot.
Bickerdike, W. E., F.I.C., F.C.S., Surbiton Place, Blackburn.
Bicknell, Mr. W., 97, Ebury Street, Pimlico, S.W.
Biddiscombe, Mr. C., 60, St. James's Place, Plumstead, S.E.
Bienvenu, Mr. J., Southampton.
Biffin, Mr. T., 156, Clapham Road, S.W.
Billing, Mr. T., 86, King's Road, Brighton.
Billington, Mr. F., 127, Wavertree Road, Liverpool.
Bindloss, Mr. G. F., 97, Leighton Road, N.W.
Bingley, Mr. J., Northampton.
Binnie, Mr. R., 137, High Street, Dumbarton, N.B.
Birch, Mr. H. C., 7, Church Road, Upper Norwood, S.E.
Bird, Mr. A., Wood Lane, Shepherd's Bush, W.
Bird, Mr. W. L., 10, Alexandra Villas, Uxbridge Road, Acton, W.
Birkett, Mr. J., 16, The Crescent, Morecambe, Lancs.
Bishop, Mr. A., Specksfields, Booth Street, N.E.
Bishop, Mr. W. B., Specksfields, Booth Street, N.E.
Bishop, Mr. W. M., 785, Old Kent Road, S.E
Blabey, Mr. J. J., Allerton Road, Woolton, near Liverpool.
Black, Mr. J., 7, Bothwell Circus, Glasgow.
Blackshaw, Mr. T., 35, Market Place, Burslem.
Blades, Mr. F., 10, Gloucester Road, W.
Blagmire, Mr. T. C., 2, St. Ann's Square, Manchester.
Blain, Mr. A. H., 341, Upper Parliament Street, Liverpool.
Blain, Mr. W., Market Street, Bolton.
Bland, Mr. H., 33, Newborough Street, Scarborough.
Bland, J. F., F.C.S., Analytical Laboratory, Stourbridge.
Blankley, Mr. W., Arnold, Nottingham.
Blanshard, Mr. G., Smith's Place, Edinburgh.
Blatchley, Mr. T., Yeadon, Yorks.
Bletsoe, Mr. J., 124, Southampton Row, W.C.
Blisset, Mr., Romsey.
Blood, Mr. C., Formby, Lancashire.
Blyton, Mr. J., 43, Heywood Street, Cheetham, Manchester.
Bolam, Mr. J., 38, Northumberland Street, Newcastle-on-Tyne.
Bollans, Mr. E., 43, Clements Street, Leamington.
Bolton, Mr. C. A., 1, Goosegate, Nottingham.
Bond, J. K., B.A., F.L.S., 42, Park Street, Plymouth.
Boor, Mr. F., Fallowfield, Manchester.
Boorne, Mr. C., Union Street, Bristol.
Booth, Mr. J., 5, Darwen Street, Blackburn.
Booth, Mr. J., Elmfield, Rochdale.
Booth, Mr. J., Heckmondwike.
Booth, Mr. W. G., 30, Swan Street, Manchester.
Booth, W. H., M.R.C.S., St. James's Street, Sheffield.
Bordass, Mr. J., Market Place, Driffield, Yorks.
Borland, Mr. J., F.C.S., 7, King Street, Kilmarnock.
Borrett, Mr. H., Harleston, Norfolk.
Borthwick, Mr. A. J., Market Place, Selkirk.
Bostock, Mr. W., Sylvester House, Ashton-under-Lyne.
Botham, Mr. G., Medical Hall, Levenshulme.
Botham, Mr. J., 180, Bury New Road, Manchester.

Bottle, A., F.C.S., Townwall Street, Dover.
Botterill, Mr. G. T., 208, Freeman Street, Great Grimsby, Lincs.
Bourdas, Mr. I., 7, Pont Street, S.W.
Bourdas, Mr. I., jun., 48, Belgrave Road, S.W.
Bowden, Mr. W., 76, Liverpool Road, Patricroft, Lancashire.
Bowker, Mr. W., 20, Manor Street, Bolton.
Bowles, Mr. W. J., 3, Newland Terrace, Kensington, W.
Bowling, Mr. J. H., 1, Dimond Street, Pembroke Dock.
Bowman, Mr. D., Carrickfergus, Ireland.
Boyce, Mr. G., Chertsey.
Boyce, Mr. J. P., Peascod Street, Windsor.
Boyd, Mr. S., 46, Mary Street, Dublin.
Braby, F., F.C.S., F.G.S., M.R.I., Mount Henley, Sydenham Hill, S.E.
Braddock, Mr. H., 33, Queen's Road, Oldham.
Bradley, Mr. F., 11, Sturt Street, Shepherdess Walk, N.
Bradley, Mr. T. D., 81, Monkton Street, Ryde, Isle of Wight.
Bradshaw, Mr. J., Adlington, near Chorley, Lancashire.
Brady, Mr. A., 29, Mosley Street, Newcastle-on-Tyne.
Brady, H. B., F.R.S., Hillfield, Gateshead.
Branson, Mr. F. W., 338, Oxford Street, W.
Brayshay, Mr. T., 38, High Street, Stockton-on-Tees.
Brayshay, Mr. W. B., 38, High Street, Stockton-on-Tees.
Brearey, Mr. W. A., Prospect Hill, Douglas, Isle of Man.
Breeze, Mr. G., 36, Catherine Street, Devonport.
Bremner, Mr. J., Buckie, Banffshire, N.B.
Brevitt, Mr. W. Y., Darlington Street, Wolverhampton.
Brewster, Mr. W., Market Place, Kingston-on-Thames.
Bridgman, Mr. W. L., St. Mary Church, Torquay.
Brierley, Mr. J., 23, Bridge Street, Burton-on-Trent.
Bright, Mr. R., 29, Broad Bridge Street, Peterboro.
Brightmore, Mr. W., 237, Maida Vale, W.
Broad, Mr. J., Rise House, Hornsey Rise, N.
Broad, Mr. J. M., Rise House, Hornsey Rise, N.
Brockbank, Mr. E., Settle.
Brockett, Mr. R. H., 41, Northumberland Street, Newcastle-on-Tyne.
Brodie, Mr. R., 253, Crown Street, Glasgow.
Brooke, Mr. C., 5A, Walcot Street, Bath.
Brooke, Mr. T., Aire Street, Leeds.
Brooks, Mr. C., 355, Wandsworth Road, S.W.
Broom, Mr. G., Llanelly, Carmarthenshire.
Broughton, Mr. A., 99, Meadow Lane, Leeds.
Brown, Mr. A. H., Shanklin, Isle of Wight.
Brown, Mr. A. J., 55, Trafalgar Terrace, Greenwich, S.E.
Brown, Mr. D., 93, Abbey Hill, Edinburgh.
Brown, Mr. E., 66, Woodhouse Lane, Leeds.
Brown, Mr. E. W., Thrapstone, Northamptonshire.
Brown, Mr. G., Sandown, Isle of Wight.
Brown, Mr. G. B., 48, Church Street, Sheffield.
Brown, Mr. H., 40, Aldersgate Street, E.C.
Brown, Mr. J., 187, Mill Street, Great Ancoats, Manchester.
Brown, Mr. J. F., 4, Market Square, Dover.
Brown, Mr. R. D., Springfield Road, Southoro', Tunbridge Wells.
Brown, Mr. W. B., 100, Fishergate, Preston, Lancs.
Brown, Mr. W. S., 113, Market Street, Manchester.
Brown, Mr. W. H., 83, Tyne Street, North Shields.
Brownen, G., F.C.S., 6, Althorpe Road, Wandsworth Common, S.W.
Brunder, J. E., M.A., 68, Grafton Street, Dublin.
Buchanan, Mr. J., 52, North Bridge, Edinburgh.
Buchanan, Dr. T. D., 24, Westminster Terrace, Glasgow.
Buck, Mr. J. M., 179, Bedford Street South, Liverpool.

Buck, Mr. R. C., 192, Breck Road, Liverpool.
Buckett, Mr. A. H., 16, Market Place, Penzance, Cornwall.
Buckle, Mr. C. F., 77, Gray's Inn Road, W.C.
Buckley, Mr. R. C., Todmorden.
Bull, Mr. B., High Street, Royston, Herts.
Bullen, Mr. T., Pelham House, Newark on Trent.
Bullock, Mr. F., 5, Hawkhurst Terrace, Anerley Road, Anerley.
Bullock, J. L., F.I.C., F.C.S., 3, Hanover Street, W.
Burch, Mr. W., High Street, West Bromwich.
Burden, Mr. E. M., 38, Duke Street, Grosvenor Square, W.
Burdon, Mr. J., Claypath, Durham.
Burdwood, Mr. J., 30, Frankfort Street, Plymouth.
Burgees, Mr. F. C., Fethard, Tipperary.
Burgess, Mr. R., Winsford, Cheshire.
Burkinshaw, Mr. W. T., Belper, Derbyshire.
Burlinson, Mr. T., Central Hall, Sunderland.
Burn, Mr. D. H., High Street, Arbroath.
Burns, Mr. W., 109, High Street, Ayr, N.B.
Burrell, Mr. G., 116, High Street, Montrose.
Burroughs, Mr. S. M., 92, Great Russel Street, W.C.
Burrows, Mr. H. C., 29, Leadenhall Street, Leicester.
Burt, Mr. G. E., 76, York Place, Westminster, S.W.
Burt, Mr. J., 61, Montague Street, Worthing.
Burton, Mr. J. D., 397, Cambridge Road, E.
Bury, Mr. J., 9, King Street, Manchester.
Busby, Mr. H. H., 1, High Street, Dulwich Road, Penge, S.E.
Busby, Mr. J., Harpenden, Herts.
Bush, Mr. T., Paulton, near Bristol.
Bushby, Mr. T., 41, Stockport Road, Manchester.
Butler, Mr. E. H., Humberstone Gate, Leicester.
Butler, Mr. J., jun., Great Bridge, Tipton.
Butt, E. N., F.C.S., 13, Curzon Street, W.
Butterworth, Mr. A., 37, Wakefield Road, Bradford, Yorks.
Byrne, Mr. S. J., Londonderry.

Caley, Mr. A. J., Bedford Street, Norwich.
Callaway, Mr. L., Ipswich.
Calvert, Mr. R., Market Cross, Stokesley, Yorks.
Campbell, Mr. G. W., Commercial Square, Leyburn.
Campbell, Mr. J., 127, Main Street, Glasgow.
Cardwell, Mr. E., Market Street, Lancaster.
Cardwell, Mr. E., Mr. Lang, Kirkdale, Sydenham, S.E.
Carlton, Mr. W. P., 8, High Street, Horncastle.
Carr, Mr. W., 170, Wharf Street, Leicester.
Carr, Mr. W. G., High Street, Berwick-on-Tweed.
Carteighe, M., F.I.C., F.C.S., 172, New Bond Street, W.
Carter, Mr. W., 2, Union Terrace, Cheetham Hill, Manchester.
Cartwright, Mr. W., Ironmarket, Newcastle-under-Lyne.
Cassels, Mr. T., Bloomgate, Lanark, N.B.
Caw, Mr. J., Cupar, Fife, N.B.
Cawdell, Mr. G., 12, London Street, Hyde Park, W.
Challice. Mr. W. G. W., 34, Villiers Street, Strand, W.C.
Challinor, Mr. S. M., 35, Deansgate, Bolton.
Chamberlain, Mr. W., Downton, near Salisbury, Wilts.
Chambers, Mr. J., Eastwood, Notts.
Chaplin, Mr. J. L., Cornmarket, Wakefield, Yorks.
Charity, Mr. W., 50, Lime Street, E.C.
Chater, Mr. E. M., 129, High Street, Watford.
Chellew, Mr. W. D., 79, Lord Street, Liverpool.
Chessall, Mr. R., Fore Street, Sidmouth.

Cheverton, G., F.C.S., The Broadway, Tunbridge Wells.
Chifney, G. J., F.C.S., High Street, Mildenhall, Suffolk.
Chignell, Mr. A., Havant, Hants.
Chipperfield, Mr. R., 50, Oxford Street, Southampton.
Chrispin, W., F.C.S., Villa Place, Thirsk, Yorkshire.
Church, Prof. A. H., M.A., F.I.C., Agricultural College, Cirencester.
Church, Mr. H. J., Cambridge.
Churchill, Mr. H., 1, High Street, Lower Norwood, S.E.
Churchouse, Mr. W. B., Medical Hall, Chard.
Clapham, Mr. J., Wade Lane, Leeds.
Clapham, Mr. J. W., junr., Oak House, Meanwood Road, Leeds.
Clapp, Mr. E. F., 35, Church Street, Stoke Newington, N.
Clarabut, Mr. J. B., 170, Lower Street, Deal.
Clark, Mr. E., Market Street, Lancaster.
Clark, Mr. J., Melbourne Terrace, York.
Clark, Mr. J. A., 11, Duncan Place, London Fields, Hackney, E.
Clark, Mr. J. W., Belvoir Street, Leicester.
Clark, Mr. R. J., 77, Old Town Street, Plymouth.
Clark, Mr. S. P., Cambusland, N.B.
Clark, Mr. W. G., 24, Glover Street, Leeds.
Clarke, Mr. A. H., Crown Hill, Croydon.
Clarke, Mr. G. B., 3, High Street, Woburn.
Clarke, Mr. I., 15, Mytongate, Hull.
Clarke, Mr. J. A., 138, London Street, Glasgow.
Clarke, Mr. J. T., 20, Great Clowes St., Lower Broughton, Manchester.
Clarke, Mr. R. F., 11, Strand, Torquay.
Clarke, Mr. T., 19, Market Place, Stockport.
Clarke, Mr. T. M., 50, George Street, Richmond, Surrey.
Clarke, Mr. W., 153, High Street, Stockton-on-Tees.
Clarke, Mr. W. L., The Pavement, Forest Hill.
Claypole, Mr. A. H., York Town, Farnborough Station, Surrey.
Clayton, Mr. F. C., 18, Wheeleys Lane, Birmingham.
Clayton, Mr. W., 41, Wicker, Sheffield.
Cleave, Mr. W., Chudleigh.
Cleaver, E. L., F.I.C., F.C.S., 209a, King's Road, Chelsea.
Clews, Mr. E. J., 37, Darlington Street, Wolverhampton.
Clifford, Mr. T. A., 3, Kildare Terrace, Westbourne Park, W.
Clift, Mr. E., Lee Bridge, Lewisham, S.E.
Clift, Mr. H., Weiden Hill, Aylesbury, Bucks.
Clift, Mr. J., Dorking.
Clifton, Mr. F., 34, Corn Market, Derby.
Clotworthy, Mr. S., 15, Bridge Street, Belfast.
Clough, Mr. J., 11, High Street, Northwich.
Coates, Mr. J. M., 53, Clayton Street East, Newcastle-on-Tyne.
Cocher, Mr. J. A., 3, St. James Street, Kings Lynn.
Cocking, Mr. F. J., 10, Wellington Street, Teignmouth.
Cocks, Mr. J. W., 1, Madeira Place, Torquay.
Cocksedge, Mr. H. B., 20, Bucklersbury, E.C.
Cockshott, Mr. W., 32, Westgate, Bradford.
Cockton, Mr. J., High Street, Maryport.
Codd, Dr. F., 51, Duke Street, Devonport.
Coker, Mr. O. C., 95, Old Town Street, Plymouth.
Colchester, Mr. W. M., junr., 52, Coronet Street, Old Street, E.C,
Colclough, Mr. W., 38a, King William Street, London Bridge, E.C.
Coldwell, Mr. D. B., 20, Sussex Street, Warwick, Square, S.W.
Cole, Mr. A. C., Lee, S.E.
Cole, F. A., F.C.S., 33, Saint Botolph's Street, Colchester.
Coles, Mr. F., 341, Amherst Road, Stoke Newington, N.
Coles, Mr. J. C., Chippenham, Wilts.
Coley, Mr. S. J., 57, High Street, Stroud.

Collett, Mr. C. B., 19, South Street, Exeter.
Collier, Mr. H., The Dispensary, Guy's Hospital, S.E.
Collier, Mr. J. A., 55, James Street, Bute Dock, Cardiff.
Collins, Mr. H. G. (Mr. Russell's), High Street, Windsor.
Commans, Mr. R. D., George Street, Bath.
Congreve, Mr. G. T., Rye Lane, Peckham, Surrey.
Connor, S., M.R.C.S.E., L.A.H.D., Hill Street, Newry, Ireland.
Conolly, Mr. S. J., Athy, Co. Kildare.
Constance, Mr. E., 114, Leadenhall Street, E.C.
Cook, Dr. E. A., F.C.S., 323, Vauxhall Road, Liverpool.
Cook, R., Esplanade, Ealing, W.
Cook, Mr. R., 28, Market Place, Great Grimsby, Lincolnshire.
Cook, Mr. T., 52, Northgate Street, Gloucester.
Cooke, Mr. J., Waterview, Blackrock, Cork.
Cooke, Mr. P., Church Row, Wandsworth, S.W.
Cooke, P. M., L.A.H., L.M., Enniscorthy.
Cooke, Mr. W., 27, St. Giles Street, Norwich.
Cooke, Mr. W. K., 80, Argyle Street, Birkenhead.
Cooley, Mr. W. B., Dudley Street, Wolverhampton.
Cooper, Mr. Albert, 80, Gloucester Road, South Kensington, S.W.
Cooper, Mr. A., 45, Market Street, Ashby-de-la-Zouch.
Cooper, Mr. F. R., 7, Exchange Street, Manchester.
Cooper, Mr. G., 101, Fore Street, Exeter.
Cooper, Mr. H., 20, Moor Street, Soho Square, W.C.
Cooper, Mr. H. G., 24, High Street, Grantham.
Cooper, Mr. J. N., Bromwich Grange, St. John's, Worcester.
Cooper, Mr. M., Church, near Accrington.
Cooper, Mr. T., 44, Market Place, Leicester.
Cooper, Mr. T., 30, Walmgate, York.
Corder, Mr. O., 31, London Street, Norwich.
Corfield, Mr. C., Church Street, St. Day, Cornwall.
Corfield, Mr. T. J. T., Church Street, St. Day, Cornwall.
Cornelius, Mr. J., 11, Regent Place, Teignmouth.
Cornell, Mr. W., 14, Tavern Street, Ipswich.
Cornish, Mr. H. R., 24, Market Place, Penzance.
Cornish, Mr. W., 174, Western Road, Brighton.
Cortis, Mr. C., 12, South Street, Worthing, Sussex.
Cossey, Mr. J., St. John's, Maddermarket, Norwich.
Cosway, Mr. E. C., 19, Notting-Hill Terrace, W.
Cotterell, Mr. W. H., 181, Snargate Street, Dover.
Cotton, Mr. J., Church Street, St. Helen's, Lancs.
Cottrill, Mr. G. J., Shepton Mallet.
Cottrill, Mr. J. W., 24, Park Terrace, Regent's Park, N.W.
Coulter, Mr. G., Sedbergh, near Kendal.
Coulter, Mr. J., 19, Queen's Square, Belfast.
Count, Mr. S., Market Place, Beccles.
Coupland, Mr. J., High Harrogate.
Courtenay, Mr. A., 5, Llanberis Terrace, Rye Croft Road, Lewisham, S.E.
Coutts, Mr. A., Path-head, Kirkcaldy, N.B.
Coverley, Mr. E. C., 4, Thayer Street, W.
Cowan, Prof., M.D., 159, Bath Street, Glasgow.
Cowgill, Mr. B. B., Sowerby Bridge, Yorks.
Coyne, J., L.R.C.P.E., L.R.C.S.I., Crossmaglen, Co. Armagh.
Cracknell, Mr. C., 217, Edgware Road, W.
Craig, Mr. G., Duncanstone, Insch, Aberdeenshire.
Crampton, Mr. J., Post Office, Sawston, Cambridge.
Crarar, Mr. J., 7, High Street, Blairgowrie.
Crawshaw, Mr. E., 15, Charterhouse Street, E.C.
Cridland, Mr. E., Stradbroke, Suffolk.
Crisp, Mr. F. A., 270, Walworth Road, S.E.

Crispe, Mr. J., 4, Cheapside, E.C.
Croly, T. H., L.R.C.P., L.M., Ballaveeney Lodge, Ballycroy, Co. Mayo.
Cromwell, Mr. O., Brixton Rise, S.W.
Cronshaw, Mr. C., 20, Market Street, Over Darwen.
Crook, Mr. C., East Thorpe, Mirfield, Yorks.
Cross, Mr. C., Winterton, Lincolnshire.
Cross, Mr. W. G., junr., Mardol, Shrewsbury.
Crow, Mr. E. L., Lee Bridge, Lewisham, S.E.
Croyden, Mr. C., 45, Wigmore Street, W.
Crozier, Mr. R., Clifton Square, Lytham.
Crozier, Mr. W., 5, Grainger Street, Newcastle-on-Tyne.
Cruickshank, Mr. J., 20, Shore, Macduff, N.B.
Cruse, Mr. T. H., Palmerston Road, Southsea.
Cryer, Mr. H., 2, Westbourne Grove, Bayswater, W.
Cubley, Mr. G. A., 4, High Street, Sheffield.
Cuff, Mr. R. C., 25, College Green, Bristol.
Cullen, Mr. R. H., 96, Westbourne Grove, Bayswater, W.
Cullen, Mr. T., 12, St. James's Place, Paisley.
Cupiss, Mr. F., The Wilderness, Diss.
Curfew, Mr. J., Flowery Field, Hyde.
Currie, Mr. J., 479, Sauchiehall Street, Glasgow.
Curtis, Mr. H., 178, High Street, Lewes.
Cuteliffe, Mr. G. J., 7, Strand, Dawlish.
Cuthbert, Mr. J. M., Bedford.
Cuthbert, Mr. R., 27, Westgate, Huddersfield.
Cutting, Mr. J., The Crow's Nest, Duffield, Derby.
Cutting, Mr. T. J., Finkle Street, Selby.

Dadford, Mr. T., 33, Gold Street, Northampton.
Dadley, Mr. E., 21, Carter Gate, Nottingham.
Dale, Mr. J., Cornbrook Chemical Works, Manchester.
Dale, Mr. J., 353, Park Road, Liverpool.
Dalwood, Mr. J. H., Cheap Street, Sherborne, Dorset.
Daniel, Mr. A., Oldmeldrum, Aberdeenshire, N.B.
Daniel, Mr. S., 30, Harbour Street, Ramsgate.
Daniel, Mr. W. L., 64, High Street, Merthyr.
Darby, S., F.I.C., F.C.S., 140, Leadenhall Street, E.C.
Darling, W. H., F.I.C., F.C.S., 126, Oxford Street, Manchester.
Darroll, Mr. W., Clun, Salop.
D'Aubney, Mr. T., 82, Shepherdess Walk, Hoxton, N.
Davenport, Mr. H., 33, Great Russell Street, W.C.
Davenport, Mr. J. T., 33, Great Russell Street, W.C.
David, Mr. J., 75, Oxford Street, Swansea.
David, Mr. S. S., Laugharne, St. Clears, South Wales.
Davidson, Mr. C., 205, Union Street, Aberdeen, N.B.
Davies, Mr. D. J., 8, Great Darkgate Street, Aberystwith.
Davies, E., F.I.C., F.C.S., Royal Institution, Liverpool.
Davies, Mr. J. H., Terrace Road, Aberystwith.
Davies, Mr. J. L., Hay, Breconshire.
Davies, Mr. M. P., Tenby.
Davies, R. H., F.I.C., F.C.S., 280, Goldhawk Road, W.
Davies, Mr. T., 2, Albert Bridge, Manchester.
Davis, Mr. D. F., 2, High Street, Leominster.
Davis, Mr. H., 19, Warwick Street, Leamington.
Davis, R. H., F.C.S., High Harrogate.
Davison, Mr. T., 126, Buchanan Street, Glasgow.
Davy, Mr. H., 20, High Street, Rotherham.
Dawson, Mr. J., 55, High Street, Dudley.
Dawson, Mr. O. R., Belle Vue Road, Southampton.
Day, Mr. J., 116, Briggate, Leeds.

Daykin, Mr. K., Church Street, Ripley, Derbyshire.
Deane, Mr. J., 17, The Pavement, Clapham Common, S.W.
Deck, A., F.C.S., 9, King's Parade, Cambridge.
Deering, Mr. A., 53, Meadow Road, Fentiman Road, Clapham, S.W.
Delves, Mr. G., 187, High Street, Exeter.
De Nance, Mr. W. C., 164, Dumbarton Road, Glasgow.
Dennis, Mr. J. L., Alfreton Road, Nottingham.
Dennison, Mr. M., 222, High Street, Dudley.
Devers, Mr. H. J., Castlebar, Ireland.
Dewson, Mr. S., 90, New Street, Birmingham.
Diack, Mr. J. M., 46, Mary Street, Dublin.
Dickie, Mr. J., 19, Struan Terrace, Victoria Road, Glasgow.
Dickins, Mr. J., 2, Commercial Buildings, Bridlington Quay.
Dinnis, Mr. J., 20, West-Hill Road, Brighton.
Diver, Mr. B., Isleham, Cambridgeshire.
Dixon, Mr. H., 13, Whitefriargate, Hull.
Dixon, Mr. J., 30, Whitefriargate, Hull.
Dixon, Mr. J., 84, Crosby Street, Maryport.
Dixon, J. B., M.D., LL.D., Grove Street, South Hackney, E.
Dobbin, Mr. W., Belfast.
Dobinson, Mr. T., Bishop Auckland.
Dobson, Mr. J., 2, Side, Newcastle-on-Tyne.
Dodd, Mr. W., 169, Southampton Street, Camberwell, S.E.
Dodds, Mr. G. F., Medical Hall, Kelso, Roxburghshire, N.B.
Dodwell, Mr. J., 178, Camberwell New Road, S.E.
Donald, Mr. D., 39, George Street, Perth.
Donston, Mr. W., High Cross, Tottenham.
Doran, Mr. A. E., Goldsmith's Terrace, Bray, Ireland.
Dott, Mr. D. B., 93, Abbey Hill, Edinburgh.
Dove, Mr. J., Sherburn, near South Milford, Yorkshire.
Dowling, Mr. R., 24, King Street, Reading.
Dowman, Mr. G., 160, High Street, Southampton.
Downing, Mr. J. G., 55, High Street, Braintree.
Downward, Mr. J., Market Street, Ulverston.
Dowson, Mr. J., 59, High Street, Redcar.
Drake, Mr. W., Wyke, near Bradford.
Draue, Mr. W., 6, Upper Richmond Road, Putney, S.E.
Draper, H. N., F.C.S., 23, Mary Street, Dublin.
Dresser, Mr. R., 13, Pavement, York.
Driver, Mr. T., Woolton, Liverpool.
Druce, Mr. G. C., 6, The Drapery, Northampton.
Duck, Mr. W. B., Hazeldean House, Warnborough Road, Oxford.
Dudden, Mr. R. M., Sutton Wick, Pensford, Bristol.
Duncalf, Mr. J. M., 10, New Cavendish Street, Portland Place, W.
Duncan, Mr. S., 17, West Blackhall Street, Greenock, N.B.
Duncan, Mr. W., 13, East Princes Street, Rothesay, N.B.
Duncanson, Mr. W., 38, Port Street, Stirling.
Dunkley, Mr. E., High Street, Tunbridge Wells.
Dunmore, Mr. G. H., 81, Malden Road, N.W.
Dunn, Mr. H., Cross Bank, Shipley, Leeds.
Dunn, Mr. J., 360, Scotswood Road, Newcastle-on-Tyne.
Dunn, Mr. S., Fore Street, St. Austell.
Dunwoody, Mr. J., 30, Market Street, Sligo.
Durden, Mr. H., 13, Cornhill, Dorchester, Dorset.
Durrant, Mr. G. R., Old Cross, Hertford.
Dutchman, Mr. W., 44, Seven Sisters Road, N.
Dutton, Mr. F., 15, Town Hall Square, Bolton.
Dutton, Mr. J., Rock Ferry, Birkenhead.
Dyer, Mr. H., Market Place, Trowbridge.
Dyer, Mr. W., Corn Market, Halifax.

Dyson, Mr. W. B., 21, Gloucester Road, South Kensington, W.

Earee, Mr. T., High Street, Staines.
Earland, Mr. W., Bexley, S.E.
Earle, Mr. F., 22, Market Place, Hull.
Earp, Mr. J., High Street, Melbourne, Derby.
Ebdell, Mr. T., Vicar Lane, Leeds.
Edgeler, Mr. W. B., High Street, Petersfield, Hants.
Edisbury, Mr. J. F., 3, High Street, Wrexham.
Edwards, Mr. E., 4, Portland Place North, Lower Clapton, E.
Edwards, Mr. G., Stockport Road, Manchester.
Edwards, Mr. J. S., Lewes Road, Brighton.
Edwards, Mr. R. S., Redruth.
Ekin, C., F.C.S., 8, Argyle Street, Bath.
Eldridge, Mr. J. H., Earlham Road, Norwich.
Elias, Mr. J. R., Pentraeth, Anglesey.
Ellinor, Mr. G., Wicker Pharmacy, Spital Hill, Sheffield.
Eliott, Mr. S., junr., 1, Eton Place, Plymouth.
Elliott, Mr. J. D., 3, Orchard Place, Woolwich Road, Greenwich, S.E.
Elliott, Mr. R., 279, High Street, Gateshead.
Ellis, Mr. T. W., Loddon, Norfolk.
Else, Mr. W., 52, King's Road, Brighton.
Emerson, Mr. C., 8, Church Street, West Hartlepool.
England, Mr. W., 17, Hampton Terrace, Hampton Park, Redland, Bristol.
Ereaut, Mr. G., 12, Bath Street, Jersey.
Esplin, Mr. A., 7, Cowgate, Dundee.
Estcourt, C., F.I.C., F.C.S., 8, St. James's Square, Manchester.
Ettles, Mr. J., 22, London Road, Brighton.
Evans, Mr. A. E., Beaufort Street, Brynmawr.
Evans, Mr. D. O., Medical Hall, Farnworth, Bolton.
Evans, Mr. E., 11, High Street, Cardigan.
Evans, Mr. E., Aberavon, Port Talbot.
Evans, Mr. E., 56, Hanover Street, Liverpool.
Evans, Mr. E., junr., 56, Hanover Street, Liverpool.
Evans, Mr. E. P., Cleobury Mortimer.
Evans, H. S., F.C.S., 60, Bartholomew Close, London, E.C.
Evans, Mr. I. H., Medical Hall, Market Cross, Lymm.
Evans, J., M.D., 49, Dawson Street, Dublin.
Evans, Mr. J. J., 56, Hanover Street, Liverpool.
Evans, Mr. J. J. O., Fore Street, Teignmouth.
Evans, Mr. J. R., 56, Hanover Street, Liverpool.
Evans, Mr. R., 116, West Derby Road, Liverpool.
Ewing, Mr. J. L., 139, Princes Street, Edinburgh.
Exley, Mr. G., 48, Hunslet Lane, Leeds.
Eyre, Mr. J. S., High Street, Launceston, Cornwall.
Eyre, Mr. S., 202, Infirmary Road, Sheffield.

Fairburn, Mr. J., Northallerton.
Fairgrieve, Mr. T., Clerk Street, Edinburgh.
Fairlie, Mr. J. E., 569, Gallowgate, Glasgow.
Fairlie, Mr. J. M., 17, St. George's Cross, Glasgow.
Fardon, Mr. H., 78, Castle Street, Bristol.
Farie, Mr. G., Bridge of Allan, Stirlingshire.
Farnsworth, Mr. T., Codnor.
Farnworth, Mr. W., 49, King William Street, Blackburn.
Farr, Mr. J., Crown Street, Halifax.
Farrage, Mr. R., Rothbury, Morpeth.
Farrett, Mr. W. B., 1, Pier Terrace, South Lowestoft.
Farries, T., F.I.C., F.C.S., 16, Coleman Street, E.C.
Farrow, Mr. C. H., 2, Upper Street, Islington.

Farthing, Mr. T., 11, High Street, Spennymoor.
Faulkner, Mr. H., 80, Commercial Road, Newport, Monmouthshire.
Faulkner, Mr. J. R., 33, Ladbroke Grove Road, W.
Faull, Mr. E., High Street, Beeston, Notts.
Faull, Mr. J., Westgate, Bradford, Yorks.
Fawcett, Mr. J., New Ferry, Birkenhead.
Fawthorp, Mr. J., Micklefield Terrace, Rawdon, near Leeds.
Fenn, Mr. J. W. T., 6, Harwood Terrace, King's Road, Fulham, S.W.
Fennings, Mr. A., West Cowes, Isle of Wight.
Fentiman, Mr. A., 2, Upper East Smithfield, Tower Hill, E.C.
Fenwick, Mr. J., 17, Bute Terrace, Queen's Park, Glasgow.
Ferguson, Mr. J., 6, Strand Street, Liverpool.
Ferguson, Mr. W. K., 53, Great George Street, Leeds.
Ferneley, Mr. C., 61, Tything, Worcester.
Field, Mr. A. W., 3, Victoria Buildings, Pimlico, S.W.
Field, J. J., F.C.S., North Lodge, New Barnet, Herts.
Field, Mr. W. C., 9, North Street, Taunton.
Filson, A., B.A., M.D., Portaferry, Co. Down.
Fincham, Mr. R., 57, Baker Street, Portman Square, W.
Fingland, Mr. J., Thornhill, Dumfries.
Finlayson, Mr. T., Leith.
Firth, Mr. W., Barker Street, Oldham.
Fisher, Mr. C., High Street, Ramsgate.
Fisher, Mr. F. D., 1, Market Place, Grantham.
Fisher, Mr. H. A., 35, High Street, Ramsgate.
Fisher, Mr. J. J., 20, Bank Street, Carlisle.
Fisher, Mr. T., 97, Roxburgh Street, Greenock, N.B.
Fitch, R., F.G.S., F.S.A., Norwich.
Fitzgerald, Mr. A. H., 42, Margary Park Road, Stratford, E.
Fitzhugh, R., F.C.S., Long Row, Nottingham.
Fleeming, Mr. W., Queen Square, Wolverhampton.
Fletcher, Mr. F. B., Retford, Notts.
Fletcher, Mr. J., 23, King Street, Dudley.
Fletcher, Mr. J., Montpellier Avenue, Cheltenham.
Fletcher, Mr. T., Smallthorne, Stoke-on-Trent.
Fletcher, Mr. T., 1, Church Road, Lytham, Lancs.
Flint, Mr. J., Ranelagh Place, Liverpool.
Flower, Mr. T. S., Opposite the Pier, Ryde, Isle of Wight.
Floyd, Mr. J., Town Hall, Bury St. Edmunds.
Flux, Mr. W., 3, East India Avenue, E.C.
Ford, Mr. J., High Street, Kirriemuir.
Forrest, Mr. R. W., 214, Cumberland Street, Glasgow.
Forster, Mr. R. H., Castle Street, Dover.
Forth, Mr. W., 397, High Street, Cheltenham.
Foster, Mr. A., Market Place, Dewsbury.
Foster, Mr. F., 52, King's Road, Brighton.
Foster, Mr. F. H., 2, Bank of England Place, Plymouth.
Foster, Mr. J., Collumpton.
Foster, Mr. J., 82, Corporation Road, Carlisle.
Foster, Mr. J. A., 7, Wheeler Street, Birmingham.
Foster, Mr. M. E., 50, Bishopsgate Within, E.C.
Foster, W., B.A., F.I.C., F.C.S., Middlesex Hospital, W.
Fothergill, Mr. S., Milnthorpe, Westmoreland.
Foulkes, Mr. W. H., 20, High Street, Rhyl, Flints.
Foulkes, Mr. W. J., Birkenhead.
Fowler, Mr. W. R., 7, Market Place, Boston, Lincs.
Fox, Mr. W., 109, Bethnal Green Road, E.
Fox, Mr. W. A., 27, Leyton Road, Stratford, E.
France, Mr. J., 18, Church Street, Rotherham.
Francis, Mr. G., Market Place, Romsey, Hants.

Francis, Mr. G. B., 5, Coleman Street, E.C.
Francis, G. B., junr., F.C.S., 5, Coleman Street, E.C.
Francis, Mr. R. P., 5, Coleman Street, E.C.
Francis, Mr. W. H., 5, Coleman Street, E.C.
Frank, Mr. J. M., Custom House Buildings, Quay Side, Newcastle-on-Tyne.
Frankland, Prof. E., D.C.L., F.R.S., P.I.C., Royal College of Chemistry, Kensington Museum, S.W.
Franklin, Mr. A., 60, West Street, Fareham.
Franks, Mr. A., 35, Addington Street, Ramsgate.
Fraser, Mr. A., 50A, Lord Street, Liverpool.
Fraser, Mr. J., 17, High Street, Inverness.
Frazer, Mr. D., 113, Buchanan Street, Glasgow.
Freeland, Mr. J., Bathgate, N.B.
Freeman, Mr. T. E., Ledbury, Herefordshire.
Freestone, Mr. T. M., Bedminster Parade, Bristol.
Frill, Mr. W. E., 15, Avenham Lane, Preston, Lancs.
Froedman, Mr. F., 23, Mary Street, Dublin.
Froggatt, Mr. T. W., Eyam, *via* Sheffield.
Froom, Mr. W. H., 75, Aldersgate Street, E.C.
Frost, Mr. G., 7, Corn Market, Derby.
Fudge, Mr. C. W., Shepton Mallet.
Fuller, Mr. T. B., Rampant Horse Street, Norwich.
Furneaux, Mr. W. H., 52, Treville Street, Plymouth.
Furniss, Mr. T., 6, Mount Vernon Road, Liverpool.

Gadd, Mr. H., 97, Fore Street, Exeter.
Gadd, Mr. R., 1, Harleyford Road, Vauxhall, S.E.
Gadd, Mr. W. F., Granville House, Queen Street, Ramsgate.
Gain, Mr. W. A., Tuxford, Nottinghamshire.
Gaitskell, Mr. J., Gosforth, *via* Carnforth.
Gale, S., F.I.C., F.C.S., 338, Oxford Street, W.
Galt, Mr. W. D., Thornley, Ferry Hill, Co. Durham.
Galwey, Mr. R. J., 49, Grafton Street, Dublin.
Gardner, Mr. A. W., Canterbury.
Gardner, Mr. J., 39, Ossington Street, Bayswater, W.
Gardner, Mr. J. R., Royal Naval Hospital, Yarmouth.
Gardner, Mr. T., Queen Street, Morecambe, Lancs.
Gardner, Mr. W., Barnard Castle.
Gare, Mr. J., 25, Newfoundland Street, Bristol.
Gare, Mr. W., Bampton, Devon.
Garland, Mr. J. F., Marshfield, Chippenham, Gloucestershire.
Garner, Mr. J., 119, High Street, Kensington, W.
Garner, Mr. T., 75, Allen Road, Stoke Newington, N.
Garratt, Mr. S., 3, Market Place, Rugby.
Garside, Mr. T., 10, Cross Street, Southport.
Gaubert, Mr. S., 81, Grosvenor Street, W.
Gaynor, Mr. P., Oldcastle, Meath.
Gedge, Mr. W. S., 90, St. John Street, Clerkenwell, E.C.
Gee, Mr. G., High Street, Sandbach, Cheshire.
Gee, Mr. S., Castleton, near Manchester.
Geldard, Mr. J., St. Austell.
George, Mr. H., 68, Broad Street, Worcester.
George, Mr. J. E., Hirwain, near Aberdare.
Gerard, Mr. G. R., Great Bedwin, Wilts.
Gerrard, Mr. A. W., University College Hospital, W.C.
Gething, Mr. W. B., 75, Fleet Street, E.C.
Gibbons, Mr. G., 24, West Street, Weston-super-Mare.
Gibbons, Mr. T. G., 41, Market Street, Manchester.
Gibson, Mr. A., Leven, Fife.
Gibson, Mr. B. W., Barnard Castle, Durham.

Gibson, Mr. J., 86, Upper Brook Street, Manchester.
Gibson, Mr. J. C., Chapeltown, near Sheffield.
Gibson, Mr. W. H., 107, King's Road, Brighton.
Gilbert, Mr. G., 28, Castle Street, Hinckley.
Gill, Mr. H., Boston Spa, Yorkshire.
Gill, Mr. J., 61, Piccadilly, Manchester.
Gill, Mr. J. W., 57, Broad Street, Pendleton, Manchester.
Gill, Mr. W., 1, West Street, Tavistock.
Gillespie, Mr. J., High Street, Irvine, N.B.
Gillett, Mr. J., 10, Nevill Street, Southport.
Gilling, Mr. J., Saffron Walden, Essex.
Gilmour, Mr. W., 11, Elm Row, Edinburgh.
Ginns, Mr. A. B., Rothwell, Northamptonshire.
Gittoes, Mr. S. J., 54, High Street, Wednesbury.
Glaisyer, Mr. T., 12, North Street, Brighton.
Glassford, Mr. J., F.C.S., 8, Adelphi Ter., Victoria Park, S. Hackney, E.
Glazier, Mr. W. H., 20, Boundary Road, St. John's Wood, N.W.
Glencross, Mr. W., Kidwelly, Carmarthenshire.
Glover, Mr. H., 51, Spon Street, Coventry.
Godfrey, Mr. F., Bank Street, Newton Abbot.
Goldfinch, Mr. G., Hendon, Middlesex.
Good, Mr. T., 31, High Street, Lowestoft.
Goodliffe, Mr. G., 17, Rendezvous Street, Folkestone.
Goodwin, Mr. J., Lower Clapton, E.
Goodwin, Mr. J., 6, Merrion Row, Dublin.
Gordelier, Mr. W. G., 39, High Street, Sittingbourne.
Gorrie, Mr. A., West End, High Street, Kirkcaldy, N.B.
Gosing, Mr. R., 29, Plungington Road, Preston, Lancs.
Goskar, Mr. J. J., 1, Carlisle Circus, Belfast.
Goss, Mr. S., 4, High Street, Barnstaple, Devon.
Gossop, Mr. G. K., 88, Church Street, Great Grimsby.
Gostling, Mr. T. P., Diss.
Gostling, Mr. W. A., Diss.
Goucher, J., F.L.S., 43, High Street, Shrewsbury.
Gould, Mr. J., Red Lion Square, Newcastle-under-Lyne.
Goulding, Wm., M.P., Summerhill House, Cork.
Gow, Mr. A., Dudley Street, Wolverhampton.
Gowans, Mr. J., 21, High Street, Perth, N.B.
Grady, Mr. F., Villa Street, Hockley, Birmingham.
Graham, Mr. J., Church Street, Carlisle.
Granger, Mr. E. J., Upper Clapton, E.
Grant, Mr. W., High Street, Blairgowrie.
Gray, Mr. C., 12, Church Street, Bilston, Staffordshire.
Gray, Mr. J. T., Crewe.
Greasley, Mr. M. F., 13, North Street, Leeds.
Greaves, Mr. A., Chesterfield.
Greaves, Mr. E., 49, High Street, Mexbro', Rotherham.
Greaves, Mr. J., Crewkerne, Somerset.
Greaves, Mr. W. S., Ironville.
Green, Mr. J., 19, Wood Street, Swindon.
Green, Mr. S., 2, York Place, Nunhead, S.E.
Greenall, Mr. A., 303, Breck Road, Liverpool.
Greenish, T., F.C.S., 20, New Street, Dorset Square, N.W.
Greenish, Mr. T. E., 20, New Street, Dorset Square, N.W.
Greenwell, Mr. R. H., Chester-le-Street.
Greenwood, Mr. J. T., 22, Market Place, Louth.
Greig, Mr. W., Glassford Street, Glasgow.
Griffin, Mr. C. H., 84, Rathmines Road, Dublin.
Griffin, Mr. T., 3, Woodhill, Northampton.
Griffith, Mr. R., High Street, Slough.

Griffiths, Mr. E. H., Kidsgrove.
Griffiths, Mr. W., 44, Wind Street, Swansea.
Grimwade, Mr. E. W., Mildmay Chambers, 82, Bishopsgate Street, E.C.
Grindley, Mr. G. H., 136, Lowet Baggot Street, Dublin.
Grindley, Mr. W., 6, Northgate Street, Chester.
Grisbrook, Mr. E., Windsor, Berks.
Grisbrook, Mr. S., 51, Wellington Street, Woolwich, S.E.
Grose, Mr. N. M., 5, Castle Street, Swansea.
Groves, T. B., F.C.S., Weymouth.
Guest, Mr. E. P., High Street, Brentwood, Essex.
Guest, Mr. G. C., 17, St. John's Square, Burslem.
Guest, Mr. W., 13, Carlton Street, Nottingham.
Gulliver, Mr. W., 6, Lower Belgrave Street, Pimlico, S.W.
Gunn, Mr. F. J., Axminster.
Gunn, Mr. W., Market Place, Dunse, N.B.
Gurnell, Mr. W., 34, Union Street, Ryde, Isle of Wight.
Gutheridge, Mr. G. F., 338, Oxford Street, W.
Guthrie, Mr. A. D., Bonnington, Edinburgh, N.B.
Guy, Mr. F., 12, North Street, Brighton.
Guyer, Mr. J. B., 11, Strand, Torquay.
Gwatkin, Mr. J. T., 49, Grand Parade, Brighton.

Hackett, Mr. J. H., 70, North Marine Road, Scarborough, Yorks.
Hackman, Mr. L. L., Lake Road, Landport, Hants.
Hadfield, Mr. J., 20, Cheetham Street, Rochdale.
Hadingham, Mr. J. W., 208, High Street, Deptford.
Haffenden, Mr. T., 46, Dyke Road, Brighton.
Haines, Mr. J. J., Market Place, Bromsgrove.
Hake, H. W., Ph.D., F.I.C., F.C.S., 12, Regent Street, S.W.
Hall, F., M.R.C.S., 1, Jermyn Street, S.W.
Hall, Mr. F., 117, Market Place, Stockton-on-Tees.
Hall, Mr. H. R. F., 1, Beverley Road, near Hull.
Hall, Mr. J. T., Medical Hall, Levenshulme.
Hall, Mr. S., 3, Alma Place, Eastbourne.
Hall, Mr. S., Littleborough, near Manchester.
Hall, Mr. T., 128, Breckfield Road North, Liverpool.
Hall, Mr. T., 80, Westgate, Grantham.
Hall, Mr. T. H., 6, North Villas, Camden Square, N.W.
Hall, Mr. W., 102, Blackman Street, S.E.
Hall, Mr. W., Market Street, Lancaster.
Hallaway, Mr. J., 52, Castle Street, Carlisle.
Hallawell, Mr. J., 63, Wood Street, Liverpool.
Halley, Mr. A., 2, Cathedral Street, Glasgow.
Hambly, Mr. C. J., 9, Sydney Terrace, Taunton.
Hambrook, Mr. J. B., 6, Stroud Street, Dover.
Hamilton, J. T., M.D., Sackville Street, Dublin.
Hamilton, J., M.D. (New York), 404, Oxford Street, W.
Hamilton, Mr. W. R., 71, Hill Street, Newry.
Hammerton, Mr. E., 28, High Street, Colchester.
Hammond, Mr. C. T., 11, Witham, Hull.
Hamp, Mr. J., Worcester Street, Wolverhampton.
Hampson, Mr. R., 205, St. John-street Road, E.C.
Hanbury, C., F.I.C., F.C.S., Plough Court, Lombard Street, E.C.
Hanbury, Mr. D. B., Clapham Common, S.W.
Hanbury, F. J., F.L.S., Plough Court, Lombard Street, E.C.
Hance, Mr. W. R., 44, Cecil Street, Limerick.
Handford, Mr. E., High Street, Torrington.
Handforth, Mr. E., Lamb Lane, Bradford.
Handley, Mr. C., 41, High Street, Stoke Newington, N.
Harburn, Mr. R. H., 71, Market Place, Bishop Auckland.

Harcus, Mr. J., 11, Grey Street, Newcastle-on-Tyne.
Hardcastle, Mr. T. P., 17, Turncroft Lane, Stockport.
Hardeman, Mr. J., 43, Bury New Road, Manchester.
Hardie, Mr. J., 68, High Street, Dundee.
Harding, Mr. J., 36, King's Head Street, Harwich.
Harding, Mr. J. J., Sudbury, Suffolk.
Hardman, Mr. J. W., 106, Woodhouse Lane, Leeds.
Hardwicke, Mr. E. J., 4, Meat Market, Bury St. Edmunds.
Hardy, Mr. S. C., 177, Regent Street, W
Hargraves, Mr. H. L., 30, High Street, Oldham.
Hargreaves, Mr. J., 50, Sankey Street, Warrington.
Hargreaves, Mr. M., 108, Fylde Road, Preston, Lancs.
Harley, Mr. J., 3, James's Square, Crieff, N.B.
Harrington, Mr. A., Needham Market, Suffolk.
Harrington, Mr. A., jun., Walsham-le-Willows, Suffolk.
Harrington, W., L.A.H.D., 80, Patrick Street, Cork.
Harris, Mr. E. R., 30, Richmond Place, Brighton.
Harris, Mr. H. W., 208, High Street, Rochester.
Harris, Mr. J., 67, Wellingborough Road, Northampton.
Harris, Mr. M. C. J., West Street, Crewkerne.
Harris, Mr. W. W., High Street, Highgate, N.
Harrison, Mr. J., 7, Central Beach, Blackpool.
Harrison, Mr. J., 33, Bridge Street, Sunderland.
Harrison, Mr. R., Farnworth, near Bolton.
Harrison, Mr. T., Sun Bridge, Bradford, Yorkshire.
Harrison, Mr. W. B., 6, Bridge Street, Sunderland.
Harrower, Mr. P., 136, Cowcaddens Street, Glasgow.
Hart, Mr. J., 131, Embden Street, Hulme, Manchester.
Hart, Mr. J., 130, Newport Street, Bolton.
Hart, Mr. T., Bolton New Road, Atherton, near Manchester.
Hart, Mr. W., 99, Higher Bridge Street, Little Bolton.
Hartford, Mr. J., 92, Bride Street, Dublin.
Hartland, Mr. J., St. Augustine's Parade, Bristol.
Hartshorn, Mr. A. F., 165, Hornley Fields, Wolverhampton.
Hartt, Mr. C., 107, Grafton Street, Dublin.
Harvey, Mr. E., Giltspur Street, E.C.
Harvey, Mr. S., 8, High Street, Canterbury.
Harvey, Mr. W. R., 98, Humberstone Road, Leicester.
Harvie, Mr. G., Princes Street, Helensburgh.
Harvie, Mr. J., 68, Stirling Street, Airdrie, N.B.
Haslett, Mr. J. H., 18, North Street, Belfast.
Hasselby, Mr. T. J., 1, Baxtergate, Doncaster, Yorkshire.
Hatch, Mr. R. M., 167, White Ladies' Road, Redland, Bristol.
Hatfield, Mr. G. B., 817, Commercial Road, Limehouse, E.
Havill, Mr. P. W., 15, Fore Street, Tiverton, Devon.
Hawkin, Mr. J., Bedale, Yorks.
Hawkins, Mr. T., 32, Ludgate Hill, E.C.
Hay, Mr. D., Nelson-in-Marsden, Burnley.
Hayes, Mr. J., Great Warley, Essex.
Hayes, Mr. W., 12, Grafton Street, Dublin.
Haydon, Mr. W. F., 23, Burlington Chambers, Birmingham.
Hayhoe, Mr. W., 60, St. George's Road, Pimlico, S.W.
Hayles, Mr. B. H., Esplanade, Ealing, Middlesex.
Haynes, Mr. C. H., 103, Talbot Road, Bayswater, W.
Hayton, Mr. P., High Street, Wigton, Cumberland.
Hayward, Mr. C. J., Lincoln.
Heald, Mr. B., Sleaford.
Heald, Mr. S., 338, Oxford Street, W.
Heap, Mr. E., Cocker Hill, Stalybridge.
Hearder, Mr. H. P., 24, Westwell Street, Plymouth.

Hearder, Mr. W., Rocombe, Torquay.
Heath, Mr. E. A., 114, Ebury Street, S.W.
Heathfield, W. E., F.C.S., F.R.S.E., 8, Wilson Street, Finsbury, E.C.
Heaton, Prof. C. W., F.I.C., F.C.S., Lessness Heath, Kent.
Hebden, Mr. W. C., Northgate, Halifax.
Helmore, Mr. W. H., 23, Cromwell Place, South Kensington.
Hemingway, Mr. A., 20, Portman Street, W.
Hemingway, Mr. E., 20, Portman Street, W.
Hemingway, Mr. W. 20, Portman Street, W.
Henderson, Mr. C., Wibsey, near Bradford.
Henderson, Mr. M. J., Main Street, Keswick.
Henry, Mr. T., Monaghan, Ireland.
Henty, Mr. H. M., 19, High Street, St. John's Wood, N.W.
Herington, Mr. J., Leighton Buzzard, Beds.
Herring, Mr. H., 40, Aldersgate Street, E.C.
Hewlett, Mr. C. J., Cree Church Lane, E.C.
Hey, Mr. D., Hebden Bridge, Yorks.
Hey, Mr. W. T., 4, Low Ousegate, York.
Heywood, J. S. C., F.C.S., 13, Hanover Terrace, Notting Hill, W.
Hibbert, Mr. W., Gnoll Park Road, Neath, Glamorganshire.
Hick, Mr. A., High Street, Wath-on-Dearne.
Hick, Mr. J., 3, Broadstones, Bradford.
Hickey, Mr. E. L., 199, King's Road, Chelsea, S.W.
Hickin, Mr. H., Mardol Head, Shrewsbury.
Hickman, Mr. W., Archer Street, Notting Hill, W.
Hicks, R., M.R.C.S., Albion Hill House, Ramsgate.
Higgins, Mr. W., 49, Borough, Farnham, Surrey.
Highway, Mr. H., Beaconsfield, Walsall.
Hilder, R. T., M.D., Grove Lodge, Balham, S.W.
Hilditch, Mr. T., 96, Tipping Street, Ardwick, Manchester.
Hill, Mr. A., 14, Oxford Street, South Heigham, Norwich.
Hill, Mr. A. A., Bowlish House, Shepton Mallet.
Hill, Mr. A. B., 101, Southwark Street, S.E.
Hill, Mr. F., Messrs. Hirst & Co., Aire Street, Leeds.
Hill, Mr. J., 1, Castle Street, Reading.
Hillidge, Mr. G., 140, Friargate, Preston.
Hillier, Mr. H., 7, Bridge Street, Bath.
Hillock, Mr. J., Armagh, Ireland.
Hills, Mr. H. W., 2, Etloe Terrace, Carlisle Road, Leyton, Essex.
Hills, T. H., F.I.C., F.C.S., 338, Oxford Street, W.
Hills, W., F.C.S., 338, Oxford Street, W.
Hinchliffe, Mr. F. G. U., 77, Portland Street, Manchester.
Hind, Mr. T. W. L., Kendal.
Hinds, Mr. H. D., Pontardulais, Carmarthenshire.
Hinds, Mr. J., 127, Gosford Street, Coventry.
Hirst, Mr. J., 17, Old Street, Ashton-under-Lyme.
Hiscock, Mr. R., 17, Broadgate, Coventry.
Histed, Mr. E., 2, Upper St. James Street, Brighton.
Hitchcock, Mr. C. E., 108, High Street, Oxford.
Hitchin, Mr. R., 54, St. James' Street, Burnley.
Hitchman, Mr. H., Market Place, Kettering.
Hobbes, Mr. A. E., 1, St. Paul's Street, Milton-next-Sittingbourne.
Hobson, Mr. C., Market Place, Beverley.
Hobson, Mr. H., 89, Ablewell Street, Walsall.
Hocken, Mr. J., 31, Old Hall Street, Liverpool.
Hodge, Mr. J., 249, Overgate, Dundee.
Hodges, Prof. J. F., M.D., F.I.C., Queen's College, Belfast.
Hodges, Mr. J. F. W., Queen's College, Belfast.
Hodges, Mr. W., Eastgate Row, Chester.
Hodgkinson, Mr. C., 127, Aldersgate Street, E.C.

Hodgkinson, Mr. G., 11, Cross Cheaping, Coventry.
Hodgkinson, Mr. J. S., Matlock Bridge.
Hodgkinson, Mr. W., 127, Aldersgate Street, E.C.
Hodkinson, Mr. J., Mill Street, Macclesfield.
Hodsoll, Mr. T. W. H., 11, Sturt Street, Shepherdess Walk, N.
Hogg, Mr. R., 42, Connaught Street, W.
Holdsworth, Mr. T. W., 32, Steelhouse Lane, Birmingham.
Holford, Mr. T. C., 342, High Street, Stratford, E.
Holliday, Mr. T., High Street, West Bromwich.
Hollier, Mr. E., Market Place, Dudley.
Holmes, E. M., F.L.S., 17, Bloomsbury Square, W.C.
Holmes, Mr. F. G., Brill.
Holmes, Mr. J., Crown Street, Leeds.
Holmes, Mr. J. T., 30, Upper Baggot Street, Dublin.
Holmes, Mr. T., 32, Seymour Road, Sharples, near Bolton.
Holmes, Mr. W. M., 63, Lupus Street, Belgravia South, S.W.
Holstead, Mr. T., St. Helen's Road, Daubhill, Bolton.
Hood, W., M.R.C.S., Castlegate, York.
Hooper, Mr. B., 43, King William Street, E.C.
Hopkin, Mr. W. K., 16, Cross Street, Hatton Garden, E.C.
Hopkinson, Mr. T., Grantham.
Hopton, Mr. E., Idle, Yorks.
Hopwood, Mr. T. S., Richmond, Surrey.
Horncastle, Mr. H., Cemetery Road, Sheffield.
Horncastle, Mr. J., 17, Craven Road, Westbourne Terrace, W.
Horne, Mr. G., 307, Oxford Street, Manchester.
Horner, Mr. E., 20, Bucklersbury, E.C.
Horner, Mr. E., jun., 20, Bucklersbury, E.C.
Horrell, Mr. A. E., 34, High Street, Dartford.
Horsfield, Mr. J. N., Sweet Street, Leeds.
Horsley, J., F.C.S., The Laboratory, Police Station, Cheltenham.
Horsley, Mr. T. W., 274, Portobello Road, Notting Hill, W.
Hothersall, Mr. J., 25, Standishgate, Wigan.
Houghton, Mr. R. W., R. N. Hospital, Haulbowline, Queenstown.
Houghton, Mr. T., 53, St. Clements, Oxford.
Houghton, Mr. W., 32, Portland Street, Southport.
How, Mr. W., 52, South Street, Dorchester.
Howard, D., F.I.C., F.C.S., Stratford, E.
Howard, J. E., F R.S., Tottenham.
Howard, Mr. W. D., Stratford, E.
Howden, Mr. R., 78, Gracechurch Street, E.C.
Howell, Mr. M., 61, High Street, Peckham, S.E.
Howie, Mr. W. L., Craigielea New Park, Eccles, Lancs.
Howlett, Mr. H. T., 22, Berkeley Street, Southsea, Portsmouth.
Howlett, Mr. H. J., 22, Berkeley Street, Southsea, Portsmouth.
Howlett, Mr. W. H., The Dispensary, Gainsborough.
Howman, Mr. P., Winchcombe.
Howorth, Mr. J., Market Place, Doncaster.
Hucklebridge, Mr. J. M., 116, Ebury Street, S.W.
Huggins, Mr. R., 235, Strand, W.C.
Hughes, Mr. E., 14, Market Place, Altrincham, Cheshire.
Hughes, Mr. E., 7, Bridge Street, Llanelly, Carmarthenshire.
Hughes, Mr. E. G., Cateaton Street, Manchester.
Hughes, Mr. F. R., Borrowstowness, N.B.
Hughes, Mr. H. M., Cross Square, St. David's.
Hughes, Mr. J. E., 15, Old Bond Street, Bath.
Hughes, Mr. L. S., 40, Aldersgate Street, E.C.
Hughes, Mr. R., Mona Drug Hall, Llangefni, Anglesey.
Hughes, Mr. S., 154, High Street, Stourbridge.
Hughes, Mr. W., High Street, Presteigne, Radnorshire.

Hugill, Mr. J., 14 & 15, Miles Lane, Cannon Street, E.C.
Hulley, Mr. J., 99, Manchester Road, Heaton Norris, Stockport.
Humby, Mr. L. W., Elstree House, Lambridge, Bath.
Hume, Mr. A., 34, Burdon Terrace, Newcastle-on-Tyne.
Hume, Mr. J. W. D., 16, Worcester Street, Gloucester.
Hume, Mr. R., 102, Cowcaddens Street, Glasgow.
Humpage, Mr. B., Turnham Green, W.
Humphries, Mr. E., Garston, Liverpool.
Humphries, Mr. E., 119, Hammersmith Road, West Kensington, W.
Hunt, Mr. A., Fore Street, Exeter.
Hunt, Mr. C., 29, Chapel Street, Belgrave Square, S.W.
Hunt, Mr. L., 2, Albert Bridge, Manchester.
Hunt, Mr. R., 45, High Street, Winchester.
Hunt, Mr. T., Workhouse, Liverpool.
Hunter, Mr. F. N., 39, Saddler Street, Durham.
Hunter, Mr. G., Withernsea, Yorks.
Hunter, Mr. H., 71, Market Place, Whitehaven, Cumberland.
Hunter, Mr. J. C., 96, Great Western Road, Glasgow.
Hurst, Mr. J., 27, Bottomoth Moor, Oldham.
Hurst, Mr. J. B., Market Place, Louth.
Husband, Mr. J. C., 2, Queen Street, Exeter.
Huskisson, H. O., F.I.C., F.C.S., Swinton Street, Gray's Inn Road, W.C
Hutchins, Mr. C., Wind Street, Neath.
Hyne, Mr. H., 19, Milton Street, Dorset Square, W.

Iberson, Mr. J., 6, Sheffield Road, Barnsley.
Iliffe, Mr. T. P., 29, Market Place, Nuneaton.
Imrie, Mr. D., 48, Front Street, Consett, Durham.
Ince, J., F.L.S., F.C.S., F.R.M.S., 29, St. Stephen's Rd., Shepherd's Bush.
Ingall, Mr. J., Ashford, Kent.
Ingham, Mr. J., Upper Tooting, S.W.
Inglis, Mr. H., 211, Every Street, Manchester.
Iredale, Mr. G., 171, York Street, Leeds.
Iredale, Mr. T., 129, North Street, Leeds.
Irish, Mr. T. C., Southgate, Middlesex.
Ismay, Mr. J. G., Groat Market, Newcastle-on-Tyne.
Ive, Mr. W., 115, Gloucester Road, South Kensington, W.
Izod, Mr. J., Church Road, Upper Norwood, S.E.

Jaap, Mr. J., 268, Buchanan Street, Glasgow.
Jackson, Mr. A. H., 43, Gt. Ducie Street, Strangeways, Manches'er.
Jackson, Mr. C., Church Road, Acton, W.
Jackson, Mr. G., 759, Rochdale Road, Harpurney, Manchester.
Jackson, Mr. J., 16, Talbot Road, Blackpool, Lancs.
Jackson, Mr. J., Messrs. Harrison, Parkinson & Co., Bradford.
Jackson, Mr. J. H., Finkle Street, Stockton-on-Tees.
Jackson, Mr. J. T., Westwood, Oldham.
Jackson, Mr. R., 2, Clegg Street, Oldham.
Jackson, Mr. R., 52, Bridlesmith Gate, Nottingham.
Jackson, Mr. W., Crediton, Devon.
Jackson, Mr. W., 43, Glover Street, Leeds.
James, Mr. J. R., 3 Hanover Street, Hanover Square, W.
James, Mr. J. T., 15, Princes Street, Hanover Square, W.
Jarmain, G., F.I.C., F.C.S., 84, Northgate, Huddersfield.
Jefferson, Mr. P., 145, Meadow Lane, Leeds.
Jefferson, Mr. T., Church Street, Lower Edmonton, N.
Jeffrey, Mr. T. A., Pittsville, Cheltenham.
Jeffries, Mr. H., 23, High Street, Guildford.
Jenkins, Mr. J. T., Denman Street, New Radford, Nottingham.
Jennings, F. M., F.C.S., Brookfield House, Cork.

Jennings, Mr. T. H., 237, Hotwell Road, Bristol.
Jewell, Mr. R. J., 86, New Bond Street, W.
Job, Mr. C. F., Market Place, Wakefield.
Jobson, Mr. R., 125, Scotswood Road, Newcastle-on-Tyne.
John, Mr. D. W., 12, Commercial Row, Pembroke.
John, Mr. W. D., 7, Maughan Terrace, Penarth, near Cardiff.
Johnson, Mr. A., 1, Beech Cottage, Moorgate Road, Rotherham.
Johnson, Mr. F., Prestwich, near Manchester.
Johnson, Mr. J., 8, Brondesbury Terrace, Kilburn, N.W.
Johnson, Mr. J. B., Uttoxeter.
Johnson, Mr. J. H., 7, Church Street, Liverpool.
Johnson, Mr. M., Huyton, Liverpool.
Johnson, Mr. M., Oakenshaw, Clayton-le-Moors.
Johnson, Mr. S. E., Ashby-de-la-Zouch.
Johnson, Mr. T., 80, Wallgate, Wigan.
Johnson, Mr. T. S., 5, Holyrood Terrace, Malvern.
Johnson, Mr. W., 5, Stanley Street, Leek, Staffordshire.
Johnstone, Mr. W., Cromarty, N.B.
Jones, Mr. A. M., King Street, Brynmawr, Breconshire.
Jones, Mr. C., 7, Market Square, Hanley.
Jones, Mr. E. B., Lammas Street, Carmarthen.
Jones, E. W. T., F.C.S., 10, Victoria Street, Wolverhampton.
Jones, Mr. F., 83, Oxford Street, Liverpool.
Jones, Mr. H., Berwyn Street, Llangollen.
Jones, Mr. H. S., 139, Fulham Road, S.W.
Jones, Mr. J., 60, Chester Road, Hulme, Manchester.
Jones, Mr. J., 27, Station Road, Hadfield.
Jones, Mr. J. H., 9, Finsbury Place North, E.C.
Jones, Mr. J. P., 2, Bridge Street, Aberayron.
Jones, Mr. J., Market Place, Llanrwst.
Jones, Mr. J. T., Bute Road, Bute Town, Cardiff.
Jones, Mr. K. L., Connah's Quay, Flintshire.
Jones, Mr. M., Chester Street, Flint.
Jones, Mr. R. A., Warrenpoint.
Jones, Mr. R. G., Commercial Place, Lye, Stourbridge.
Jones, Mr. R. T., Bute Street, Treherbert.
Jones, Mr. S. U., Chirton House, Leamington.
Jones, Mr. T. P., Seven Sisters' Road, N.
Jones, T., F.G.S., F.R.A.S., 1, Brunswick Villas, Upper Eglington Terrace, Shooter's Hill, Woolwich.
Jones, Mr. T. P., 33, Broad Street, Welchpool.
Jones, Mr. W. C., 23, Bayswater Terrace, Bayswater, W.

Kay, Mr. J., High Street, Crewe.
Kaye, Mr. H., Berry Brow, Huddersfield.
Kearnes, Mr. R. H., Swan Bank, Bilston.
Keen, Mr. B., Totnes, Devon.
Keene, Mr. E., 143, New Bond Street, W.
Keene, Mr. J., Biggenden, Brenchley, Kent.
Kelley, Mr. R., Croscombe House, Wells, Somersetshire.
Kemble, Mr. J., Mevagissey, Cornwall.
Kemp, Mr. D., 106, High Street, Portobello, Mid-Lothian.
Kemp, Mr. J., Cullen, Banffshire.
Kendall, Mr. F., Bishopton, Stratford-on-Avon.
Kennedy, M. S., L.R.C.S.I., Tipperary.
Kennedy, Mr. W., 59, Trongate, Glasgow.
Kensington, E., F.C.S., Weston-super-Mare.
Kent, Mr. G. F., 134, Broad Street, Pendleton, Manchester.
Ker, Mr. A., 92, Lower Moss Lane, Hulme, Manchester.
Kerfoot, Mr. T., 113, London Road, Manchester.

Kerr, Mr. C., 56, Nethergate, Dundee.
Kershaw, Mr. J., Neville Street, Southport.
Keyworth, G. A., F.C.S., Harold-Dene, Hastings.
Kimberley, Mr. W., 22, Balsall Street, Birmingham.
Kinch, Mr. C. J., Eaton Hastings, Lechlade.
King, Mr. W., 4, Market Place, Huddersfield.
Kingerlee, Mr. G., Castle Street, Buckingham.
Kingsford, Mr. F., 54, Piccadilly, W. [Kensington, W.
Kingzett, C.T., F.I.C., F.C.S., 12, Auriol Road, Cedars Estate, West
Kinninmont, A., F.C.S., 69, South Portland Street, Glasgow.
Kirk, Mr. S., 89, Upper North Street, Poplar, E.
Kirkbride, Mr. W., 8, Middlegate, Penrith, Cumberland.
Kirkby, Mr. R., Serpentine Road, Kendal.
Kirkup, Mr. T., 65, Elswick Road, Newcastle-on-Tyne.
Kitchin, A., F.I.C., F.C.S., 27, King Street, Whitehaven.
Kite, Mr. W. T., 1, Ormond Villas, Cheltenham.
Knight, Mr. J., 91, City Road, E.C.

Laird, Mr. G. H., 40, Queensferry Street, Edinburgh.
Laird, Mr. J., 118, George Street, Limerick.
Lake, Mr. R., 63, Lupus Street, Pimlico, S.W.
Lakeman, Mr. N., Post Office, Modbury.
Lamb, Mr. T. C., 137, High Street, Chatham.
Lambert, Mr. J., Elvet, Bridge, Durham.
Lambert, Mr. W. H., The Cross, Newtown, Montgomeryshire.
Lamplough, Mr. H., 113, Holborn Hill, W.C.
Lane, Mr. W., 69, Market Street, Manchester.
Langdale, Mr. E. F., 72, Hatton Garden, E.C.
Langford, Mr. J. B., Wellington, Somerset.
Large, Mr. J. H., 65, New North Road, N.
Law, Mr. A., 290, Pentonville Road, King's Cross, W.C.
Lawrance, Mr. E., Welwyn, Herts.
Laws, Mr. J., 111, Church Street, N.W.
Lawson, Mr. E. J., High Street, Whitstable.
Lea, Mr. J., 4, Harbour Street, Folkestone.
Leach, Mr. J., Crawley, Sussex.
Leath, Mr. J., 5, St. Paul's Churchyard, E.C.
Lee, Mr. J., 9, Kimberley Terrace, Great Yarmouth.
Lee, Mr. S. W., 5, Church Street, Liverpool.
Lee, Mr. W., Castle, Northwich, Cheshire.
Lee, Mr. W., High Street, Honiton, Devon.
Leigh, Mr. J. J., 63, Bondgate, Bishop Auckland.
Leighton, Mr. J. H., 12, Elvet Bridge, Durham.
Lemmon, Mr. R., Hythe, Kent.
Lenfestey, Mr. W. G., 9, Market Street, Faversham.
Lescher, Mr. F. H., 60, Bartholomew Close, E.C.
Lester, Mr. T. R., 107, Patrick Street, Cork.
Le Tall, Mr. F. T., Woodhouse.
Lewin, Mr. A. C., 7, Whimple Street, Plymouth.
Lewinton, Mr. A. B., 14, Cleveland Street, Fitzroy Square, W.
Lewis, Mr. J., 2, Nantygwenith Street, Merthyr.
Lewis, Mr. R., 3, Taylor Street, Liverpool.
Lincolne, Mr. W., Ely, Cambridgeshire.
Lindop, Mr. W. J., High Street, Bloxwich, near Walsall.
Lindsay, T., F.C.S., 288, Renfrew Street, Glasgow.
Linford, J. S., F.C.S., The Quabbs, Drybrook, Gloucestershire.
Ling, Mr. E., Esher, Surrey.
Lister, Mr. S., 70, High Street, Great Horton, Bradford.
Little, Mr. H., 82, Seven Sisters' Road, N.
Littlewood, Mr. S., Sutton-in-Ashfield.

Llewellyn, Mr. R., 148, High Street, Merthyr.
Lloyd, Mr. E., jun., Abergele.
Lloyd, Mr. G. H., 30, Church Street, Bilston.
Lloyd, Mr. J., Piccadilly, Hanley.
Lloyd, Mr. J. W., 90, Oxford Street, Swansea.
Lloyd, Mr. J. W., 30, Mount Pleasant, Liverpool.
Lloyd, Mr. T. H., 10, Friar Lane, Leicester.
Lockhart, Mr. J., Maryhill, near Glasgow.
Lockyer, Mr. G., 208, High Street, Deptford, S.E.
Lockyer, W. J., F.C.S., Pembroke Villa, Elgin Park, Redland, Bristol.
Long, Mr. A. T., Bognor, Sussex.
Long, Mr. H., 2, Western Place, Hove, Brighton.
Long, Mr. H., 48, High Street, Notting Hill, W.
Long, Mr. H., 90, High Street, Croydon.
Longbotham, Mr. J., Chester-le-Street, Durham.
Longley, Mr. J. W., 73, North Street, Leeds.
Longman, Mr. J. H., 3, St. Mary's Street, Weymouth.
Longrigg, Mr. J., Appleby, Westmorland.
Lord, Mr. C., Todmorden, Lancashire.
Lord, Mr. L., Bank Street, Rawtenstall.
Lorimer, Mr. J., North London Chemical Works, Holloway Road, N.
Lowe, A. J. G., F.I.C., 167, Fenchurch Street, E.C.
Lowther, Mr. M. K., 70, Osborne Street, Hull.
Luff, A. P., F.C.S., St. Mary's Hospital, W.
Luff, Mr. R., Prospect House, 1, Bute Street, South Kensington.
Luke, Mr. R. S., 30, Tavistock Road, Plymouth.
Lumby, Mr. A., Tranmere, Liverpool.
Lunan, Mr. A., Banchory, N.B.

McAdam, Mr. R., 34, Virginia Street, Glasgow.
Macadam, S., Ph.D., F.I.C., F.C.S., Surgeons' Hall, Edinburgh.
Macadam, Mr. W. I., Analytical Laboratory, Surgeons' Hall, Edinburgh.
Macaulay, Mr. J. J., Holyrood, Co. Down.
MacCreath, Mr. J., 47, Victoria Street, Newton Stewart, Wigtonshire.
Macdonald, Mr. J., 18, West Newington, Edinburgh.
Mace, Mr. J., 3, St. James Street, Bacup.
Macfarlane, Mr. A. Y., 255, Cannongate, Edinburgh.
Macfarlane, Mr. T. B., 17, Main Street, Wishaw, N.B.
Machattie, A. T., Ph.D., F.C.S., 88, Hope Street, Glasgow.
Machon, Mr. H., Market Place, Saffron Walden.
Macintosh, Mr. A., 21, Montague Street, Rothesay.
Mackay, Mr. G. D., 119, George Street, Edinburgh.
Mackay, J., F.C.S., 119, George Street, Edinburgh.
Mackenzie, Mr. J., 45, Forrest Road, Edinburgh.
Mackey, Mr. J. B., 2, Bouverie Street, E.C.
Mackill, Mr. R. C., Cadrow Street, Hamilton.
Maclagan, D., M.D., F.C.S., 28, Heriot, Row, Edinburgh.
Macpherson, Mr. A., Stornoway.
McClean, Mr. J., 80, Back Lane, Hyde.
McCowan, Dr. W., F.C.S., Abbey and Holyrood Breweries, Edinburgh.
McCulloch, Mr. F., Address unknown.
McDiarmid, Mr. J. B., 19, Lower Street, Deal.
M'Donald, Mr. K., Dunkeld.
McGlashan, Mr. D., Fountain Bridge, Edinburgh.
McGregor, Mr. G., Ellon, Aberdeen.
McKenzie, Mr. W., 17, Great Western Road, Glasgow.
McLean, Mr. K., Loftus, Saltburn-by-the-Sea.
McLeod, Mr. T., 154, Broomielaw, Glasgow.
MacManus, J. H., L.A.H.D, Longford, Ireland.
M'Millan, Mr. J., 17, Great Western Road, Glasgow.

McMullen, Mr. T., 42, Victoria Street, Belfast.
McMurray, Mr. J., 19, George Street, Paisley, N.B.
M'Naught, Mr. A., 4, West Blackhall Street, Greenock.
McNicol, Mr. J., Apothecary Hall, Alva, Stirlingshire.
Macnight, Mr. S. W., 81, High Street, Kirkcaldy.
McVitie, Mr. T., 15, Old Hall Street, Liverpool.
Maggs, Mr. T. C., Yeovil.
Makins, G. H., F.C.S., Danesfield, Walton-on-Thames.
Maleham, Mr. H. W., 7, West Bar, Sheffield.
Manfield, Mr. W., Kirkgate, Leeds.
Manfull, Mr. H. J., 83, Arkwright Street, Nottingham.
Mangnall, Mr. W., 39, High Street, Sittingbourne, Kent.
Manning, Mr. R. J., Wells, Somerset.
Marcham, Mr. J., 2, Lower Bridge Street, Chester.
Marreco, Prof. A. F., M.A., F.I.C., F.C.S., Newcastle-on-Tyne.
Marris, Mr. T., 82, Bridge Street, Worksop, Notts.
Marsden, Mr. T. B., Snaith, Yorkshire.
Marsh, Mr. J. H., 6, Milsom Street, Bath.
Marshall, Mr. A., 9, Marlboro' Terrace, Upper Holloway, N.
Marshall, Mr. W., F.B.S., 9, Duggan Place, Rathmines, Dublin.
Marson, Mr. B. B., 174, Park Road, Liverpool.
Marston, Mr. J. T., 105, London Wall, City, E.C.
Martin, Mr. N. H., 29, Mosley Street, Newcastle-on-Tyne.
Martin, Mr. R., 11, Church Street, Deansgate, Bolton, Lancs.
Martin, Mr. T., 4, Quadrant, Lime Street, Liverpool.
Martindale, W., F.C.S., 10, New Cavendish Street, W.
Mason, Mr. A., 29, Yorkshire Street, Rochdale.
Mason, A. H., F.C.S., 56, Hanover Street, Liverpool.
Mason, Mr. H. C., 29, Woodstock Road, Finsbury Park, N.
Mason, Mr. R. W., 3, Northumberland Terrace, Gunnersbury Station, W.
Mason, Mr. W. B., 117, Derby Street, Bolton.
Mather, Mr. J. H., 80, St. Mary Street, Weymouth.
Mather, Mr. W., 84, Corporation Street, Manchester.
Mathews, Mr. J. H., 1, Queen's Gardens, Hyde Park, W.
Mathias, Mr. T., Saundersfoot, Pembrokeshire.
Matthews, Mr. E., High Street, Royston, Herts.
Matthews, Mr. H., 7, Old King Street, Bristol.
Matthews, Mr. W., 12, Wigmore Street, W.
Matthias, Mr. J. J., City Chambers, Railway Place, Fenchurch St., E.C.
Maunder, Mr. R., 714, Rochdale Road, Manchester.
Maw, Mr. C., 11, Aldersgate Street, E.C.
Maxwell, Mr. G. N., High Street, Biggleswade.
May, Mr. J., Garden Wharf, Battersea, S.W.
Mayfield, Mr. J. T., Messrs. Mawson & Swan, Newcastle-on-Tyne.
Mayger, Mr. W. D., 6, Regent Square, Northampton.
Mayger, Mr. W. J., 6, Regent Square, Northampton.
Mays, Mr. R. J. J., 3, Market Place, South Shields.
Meadows, Mr. H., 15, Westgate Street, Gloucester.
Meadows, Mr. J., 44, Humberstone Gate, Leicester.
Medcalfe, Mr. B. P., 40, Aldersgate Street, E. C.
Meldrum, Mr. E. D., 151, Great Junction Street, Leith.
Mellin, Mr. G., 16, Tichborne Street, Regent Street, W.
Mellin, Mr. J. P., High Street, Wimbledon.
Mellor, Mr. J. G., Market Square, St. Neots, Hunts.
Mells, Mr. H., Kirton, near Boston.
Mercer, Mr. A., Prestwich, Manchester.
Mercer, Mr. G. T., Market Street, Wooler, Northumberland.
Mercer, Mr. J., 121, Adelphi Street, Preston.
Merrell, Mr. J., 1, Queen's Terrace, Camden Road, N.W.
Merrikin, Mr. J. B., 2, Beaufort Buildings West, Bath.

Merry, Mr. W., Market Place, Ilkeston, near Nottingham.
Merson, Mr. W., The Dispensary, Paignton.
Metcalfe, Mr. A. A., 147, High Street, Great Horton, Bradford.
Metcalfe, Mr. C. L., 13, Whitefriargate, Hull.
Michie, Mr. J., High Street, Forres, Elginshire.
Midgeley, Mr. C., 2, St. Ann's Square, Manchester.
Midgley, Mr. F., 10, Mill Street, Padiham.
Midgley, Mr. J. H., 4, Rue Bank Crescent, Edinburgh.
Miles, Mr. G., Freemantle, near Southampton.
Miller, Mr. C. B., 8, Osborne Place, Blackheath, S.E.
Miller, Mr. T. S., Gray Street, Broughty Ferry, Dundee.
Miller, Mr. W. C., 107, Hockley Hill, Birmingham.
Millidge, Mr. W. H., 47, High Street, Newport, Isle of Wight.
Millington, Mr. W. S., Apothecaries Hall, Acton.
Mills, Mr. J., Eastgate Row, Chester.
Mills, Mr. R. M., Bourne, Lincolnshire.
Milne, Mr. W., 9, Wellswood Place, Torquay.
Milner, Mr. J. G., 14, Bridge Street, Hull.
Minshull, Mr., 42, Dudley Street, Wolverhampton.
Mitchell, Mr. A., Portree, Isle of Skye, N.B.
Mitchell, Mr. F., 31, London Street, Fitzroy Square, W.
Mitchell, Mr. J., 151, Oxford Street, Manchester.
Moinet, F. W., M.D., 13, Alva Street, Edinburgh.
Monkhouse, Mr. H., All Saint's Derby.
Moore, Mr. R., Post Office, Dale Street, Ossett.
Moore, Mr. W. J., 26, King Street, Stirling, N.B.
Moore, Mr. W. V., 15, Princess Square, Plymouth.
Moorhouse, Mr. W., 40, Kirkgate, Wakefield.
Morgan, W., Ph.D., 28, Orange Street, Swansea.
Morgan, Mr. W. J., 5, Holyrood Terrace, Malvern.
Morison, Mr. G., High Street, Peebles, N.B.
Morris, Mr. G. E., 74, Nevill Road, Stoke Newington, N.
Morris, Mr. J. O., 37, Digbeth, Walsall.
Morris, Mr. T., 118, Market Street, Farnworth, Bolton.
Morrison, Mr. D., 116, West Bow, Grass Market, Edinburgh.
Morrow, B., L.A.H.D., Down Patrick, Ireland.
Morson, T., F.C.S., 124, Southampton Row, W.C.
Mortimer, Mr. J., 1, Mall Place, Clifton, Bristol.
Morton, Mr. J., Ramsbottom.
Morton, Mr. T., 11, Albion Terrace, Kirkintilloch.
Moscrop, Mr. T., 19, Park Hill Place, Bolton.
Moss, J., F.I.C., F.C.S., 300, High Holborn, W.C.
Moulden, Mr. W., 49, King William Street, Blackburn.
Moyle, Mr. J., 27, Broadway, Hammersmith, W.
Muir, Mr. G., 98, Cumberland Street, Glasgow.
Muir, M. M. P., F.C.S., Gonville and Caius College, Cambridge.
Mullock, Mr. R., Charing Cross, Birkenhead.
Mumbray, Mr. H. G., Great Cheetham St., Higher Broughton, Manchester.
Mumbray, Mr. R. G., Richmond, Surrey.
Mumby, Mr. C., 47, High Street, Gosport.
Murdoch, Mr. D., Falkirk, N.B.
Murdoch, Mr. G., 249, Sauchiehall Street, Glasgow.
Murdoch, Mr. J., 34, Virginia Street, Glasgow.
Murphy, Mr. W. C., Westfield, Harold's Cross Road, Dublin.
Murray, Mr. E. P., 1, Whitehall Street, Clones, Ireland.
Muskett, Mr. J., Harleston, Norfolk.
Myers, Mr. G., 68, High Street, Hull.

Nairne, Mr. J. S., 11, Winton Terrace, Glasgow.
Napier, Mr. A., 69, South Clerk Street, Edinburgh.

Napier, Mr. G. L., 56, South Street, Exeter.
Nash, Mr. H., 1, Alexandra Road, Kilburn Park, N.W.
Naylor, Mr. W. A. H., 300, Holborn, W.C.
Neale, Mr. H., Riddings, near Alfreton, Derbyshire.
Nesbit, Mr. J., 162, High Street, Portobello.
New, Mr. W. W., 238, Essex Road, Islington, N.
Newbigin, Mr. J. L., Alnwick.
Newby, Mr. R. J., Castelnau, Barnes, S.W.
Newcome, Mr. J., 70, High Street, Grantham.
Newman, Mr. R., Load Street, Bewdley.
Newman, Mr. W. F., 8, Market Street, Falmouth.
Newport, Mr. W., Foulsham, Norfolk.
Newsholme, Mr. W., Bradford, Yorkshire.
Newton, Mr. T. A. C., 42, Duke Street, Manchester Square, W.
Nicholls, Mr. T., 99, Wick Road, South Hackney, E.
Nicholson, Mr. A., 11, Pantiles, Tunbridge Wells.
Nicholson, Mr. D. G., Mere Street, Diss.
Nicholson, Mr. H., 38, Argyle Street, Birkenhead.
Nicholson, J. J., F.C.S., High Street, Sunderland.
Nicholson, Mr. W. O., Brigg, Lincolnshire.
Nickson, Mr. J., 56, Broad Street, Ludlow.
Nicol, Mr. J., Partick, Glasgow.
Nicol, Mr. W., Carnoustie, Forfarshire, N.B.
Niven, Mr. W., Morningside, Edinburgh.
Noble, Mr. A., 139, Princes Street, Edinburgh.
Noble, Mr. J., 63, King's Street, South Shields.
Norman, Mr. J. S., Louise Cottage, Costin Street, Bedford.
Nowell, Mr. B., Auriol House, Hammersmith.
Nowers, Mr. E. A., Lydd, East Kent.
Nugent, Mr., 38, Arrow Quay, Dublin.
Nuthall, Mr. E., Bank Plain, Norwich.
Nutt, Mr. A. J., 47, Piccadilly, W.

Oakland, Mr. C., 13, Warser Gate, Nottingham.
Oakland, Mr. W., 151, Arkwright Street, Nottingham.
Odling, Prof. W., M.B., F.R.S., 15, Norham Gardens, Oxford.
Ogilvie, Mr. W. O., 2, West Port, Arbroath.
Oglesby, Mr. J., 31, Micklegate, York.
Oldham, Mr. J., Market Street, Mansfield, Notts.
Oldham, Mr. W., 38, Waterloo Road, Burslem.
Olive, Mr. W. T., Charles Street, Briton Ferry, Glamorganshire.
Oliver, Mr. J. G., Holsworthy, Devon.
O'Neill, Mr. J., South Bank, Yorks.
Orchard, Mr. E. J., Market Place, Salisbury.
Orme, Mr., Long Street, Atherstone.
Orpe, Mr. T. M., 329, Old Kent Road, S.E.
Owen, Mr. G. B., 21, Broad Street, Park, Sheffield.
Owen, Mr. J., Bishops' Castle, Salop.
Owen, Mr. J., Holloway Road, Islington, N.
Owen, Mr. S., Address unknown.
Owen, Mr. W., 52, Collingwood Street, Newcastle-on-Tyne.
Oxborrow, Mr. E., 1, Victoria Terrace, Hockley, Birmingham.

Padwick, Mr. J., 5, Preston Street, Brighton.
Padwick, Mr. T., Redhill.
Page, Mr. J., 47, Blackfriars Road, S.E.
Paine, Mr. C., 3, Commercial Street, Newport, Mon.
Paine, Mr. S., 7, Exchange Street, Manchester.
Palethorpe, Mr. S., Six Ways, Smethwick, near Birmingham.
Palmer, Mr. A. N., 69, Market Street, Manchester.

Palmer, Mr. F. W., Ramsey, Hunts.
Palmer, Mr. P. L., East Sheen, Mortlake, Surrey.
Paris, Mr. W., 253, Crown Street, Glasgow.
Park, Mr. W., Grey Street, Broughty Ferry, Dundee.
Park, Mr. W. S., 84, Queen Street, Dublin.
Parker, Mr. F. C., Ladybank Works, Dundee, N.B.
Parker, Mr. T., 17, Bridge Street, York.
Parker, Mr. W., Corner of Butler Street, Otley Road, Bradford.
Parker, Mr. W. H., 159, Alfreton Road, Nottingham.
Parkes, Mr. J. P., Leyton House, Albion Road Stoke Newington, N.
Parkinson, Mr. R., 1, William Henry Street, Soho, Liverpool.
Parkinson, Dr. R., Sun Bridge Buildings, Bradford, Yorkshire.
Parkinson, Mr. T., 30, Market Place, Great Driffield.
Parkinson, Mr. W., 32, Lees Road, Oldham.
Parr, Mr. S., Long Row, Nottingham.
Pars, Mr. R. C., Thrapstone.
Pasmore, Mr. F. R., 26, Cullum Street, Fenchurch Street, E.C.
Pasmore, Mr. G., 1, Corner of Southernhay, Exeter.
Passmore, Mr. F., 17, Bloomsbury Square, W.C.
Patchett, I., F.C.S., F.R.A.S., Birstall, near Leeds.
Paterson, Mr. A., 6, Camden Place, Plantation, Glasgow.
Paterson, Mr. J., Helmsdale, Sutherlandshire.
Paton, J., F.L.S., Kelvingrove Museum, Glasgow.
Patterson, Mr. D. J., West Hill, Mansfield, Notts.
Pattinson, J., F.I.C., F.C.S., 75, The Side, Newcastle-on-Tyne.
Pattinson, Mr. J. S., 41, Botchergate, Carlisle.
Pattison, Mr. G., 139, St. John Street Road, E.C.
Payne, A., F.C.S., Galen Works, Ettingshall, Wolverhampton.
Payne, Mr. J. C. C., Botanic Road, Belfast.
Payne, Mr. J. B., 63, Piccadilly, Manchester.
Payne, Mr. S., Wallingford, Berkshire.
Peake, Mr. A., Queen Street, Earlestown.
Peake, Mr. H., New Bridge, Dover.
Peake, Mr. H. F., Twickenham.
Pearce, Mr. J., Crewkerne.
Pearce, Mr. J. A., Cainscross, Stroud.
Peatson, Mr. H. R., 102, Broughton Road, Salford, Manchester.
Peck, Mr. F. A., Medical Hall, Sea View Street, Cleethorpes.
Pedler, Mr. G. S., 199, Fleet Street, E.C.
Pedley, Mr. T., Mill Bank, Triangle, near Halifax.
Penketh, Mr. J., Address unknown.
Penney, Mr. W., High Street, Poole.
Penney, Mr. W. S., Mostyn Street, Llandudno.
Pennington, Mr. T., 14, Bolton Street, Bury, Lancaster.
Penrose, Mr. A. P., 5, Amwell Street, E.C.
Perfect, Mr. R., Bingley, near Leeds.
Perry, Mr. G. E., 77, Hagley Road, Birmingham.
Peters, Mr. J., Shore Street, Gourock.
Peters, Mr. J. F., 4, High Street, Jedburgh, N.B.
Pettinger, Mr. E., 57, High Street, Hampstead, N.W.
Phillips, Mr. J., Church Stretton, Salop.
Phillips, Mr. J., 60, Wallgate, Wigan.
Philp, Mr. J., Wadebridge, Cornwall.
Pickard, Mr. W., 130, High Street, Notting Hill, W.
Picken, Mr. T. W., Newport, Salop.
Pickering, Mr. A., 45, Lowgate, Hull.
Pickering, Mr. J., Market Place, Crowle, Doncaster.
Picnot, Mr. C., 24, High Street, Strood.
Pidd, Mr. A. J., 221, Chester Road, Hulme, Manchester.
Pilley, Mr. S., 9, Bargate, Boston.

Pinkerton Mr. J. S., 248, London Road, Glasgow.
Pinkerton, Mr. W., 17, Greenside Place, Edinburgh.
Pitcher, Mr. W. J., Boston.
Pitman, Mr. J., 50, Redcliff Hill, Bristol.
Place, Mr. F. W., Betley, Crewe.
Plant, Mr. W. E., Somerby, near Oakham.
Plowman, S., F.I.C., F.C.S., 2, Residence, St. Thomas's Hospital, S.E.
Plumley, Mr. J. G., The Bridge, Bristol.
Pocklington, Mr. H., 23, Park Row, Leeds.
Poingdestre, Mr. C. R., 187, Newington Butts, S.E.
Pollard, Mr. H. H., 140, High Street, Ryde, Isle of Wight.
Pond, Mr. B. C., 4, The Pavement, Brixton Rise, S.W.
Pond, Mr. G. P., 68, Fleet Street, E.C.
Ponsford, Mr. J., Wolborough Street, Newton Abbot, Devon.
Poole, Mr. J., 50, High Street, Newcastle, Staffs.
Porter, Mr. J., Coalville, Leicestershire.
Postans, Mr. A. W., 35, Baker Street, W.
Potter, Mr. H., 8, Park Terrace, Sutton, Surrey.
Potts, E., F.C.S., Villiers Street South, Sunderland.
Potts, Mr. R. S., Market Place, Ilkeston.
Potts, Mr. T., 5, Grainger Street, Newcastle-on-Tyne.
Powell, Mr. D., St. Thomas, Swansea, Glamorganshire.
Powell, Mr. W., Boar Lane, Leeds.
Power, Mr. E., Walton-on-Thames.
Powers, Mr. E., Priory Works, Coventry.
Pownall, Mr. T. R., 45, St. George's Road, Bolton.
Pratt, Mr. G. W., 49, Cavendish Street, Chorlton-on-Medlock, Manchester.
Pratt, Mr. R. M., Cattle Market, Otley, Yorks.
Preston, Mr. J., 4, High Street, Sheffield.
Preston, Mr. J. C., 88, Leadenhall Street, E.C.
Price, Mr. R., 54, Loftus Road, Shepherd's Bush, W.
Price, Mr. T. U., High Street, Arundel.
Prichard, Mr. E., 10, Vigo Street, Regent Street, W.
Pridmore, Mr. W., Castle Street, Hinckley, Leicestershire.
Prince, Mr. A. G., 2, Market Street, Longton, Staffs.
Prince, Mr. H., 5, Fore Street, Taunton.
Pring, R. W., L.A.H.D., 7, Plough Buildings, Belfast.
Prior, Mr. G. T., 32, Broad Street, Oxford.
Pritchard, Mr. J., Cheadle, Manchester.
Probyn, Mr. C., 55, Grosvenor Street, Grosvenor Square, W.
Procter, Dr. W., 24, Petergate, York.
Proctor, Mr. A. D., Dufftown, Banffshire.
Proctor, Mr. B. S., 11, Grey Street, Newcastle-on-Tyne.
Proctor, Mr. R., Penarth, Glamorganshire.
Pugh, Mr. G., 11, Grenville Square, W.C.
Pugh, Mr. H., Llanegryn, near Towyn, Merionethshire.
Pullan, Mr. T., 174, Lumb Lane, Bradford, Yorkshire.
Pullin, Mr. W. H., 42, Parade, Leamington.
Purdue, Mr. T., Witney, Oxon.
Purdy, Mr. J. T., Willington, via Durham.
Purefoy, R. D., M B., Rotunda Hospital, Dublin.
Purves, Mr. S., 70, Haymarket Terrace, Edinburgh.

Queale, Mr. J. W., 3, Teremire Road, Rathgar, Dublin.
Quinlan, Prof. F. J. B., M.D., 29, Lower Fitzwilliam Street, Dublin.

Radley, Mr. W. V., 7, Hampton Road, Southport.
Raimes, Mr. R., Bonnington Park, Edinburgh.
Rait, Mr. R. C., 322, Hamilton Place, Partick, Scotland.
Ramsbottom, Mr. G., Waterfoot, near Manchester.

Randall, W. B., F.C.S., 146, High Street, Southampton.
Ransom, Mr. W., Hitchin.
Rastrick, Mr. R. J., King's Road, Southsea, Hants.
Ratcliffe, Mr. W., 4, Larches Lane, Compton Road, Wolverhampton.
Rattray, Mr. W., Links Street, Aberdeen.
Rawlings, Mr. C. J., Market Place, Warminster.
Rayner, Mr. J., Long Row, Nottingham.
Rayson, Mr. A. J., 5, Parade Terrace, South Lowestoft.
Rayson, Mr. H., 3, Mornington Terrace, Wanstead, E.
Read, Mr. W., Helmsley, Yorks.
Reade, Mr. O. A., Royal Naval Hospital, Plymouth.
Reboul, A. P., D.L.R.C.S., 60, Liverpool Road, N.
Redfern, Mr. T., 50, King Street, Penrith.
Redwood, Prof. T., Ph.D., F.I.C., F.C.S., 17, Bloomsbury Sqnare, W.C.
Rees, Mr. D., Conwill Elvet, near Carmarthen.
Rees, Mr. W. H., Dartmouth.
Reichardt, Mr. E., 11, Great Titchfield Street, Oxford Street, W.
Remmers, Mr. B. H., 63, West Regent Street, Glasgow.
Reynolds, Mr. F., 14, Commercial Street, Leeds.
Reynolds, Mr. J. J., 3, Chapel Place, Cavendish Square, W.
Reynolds, R., F.C.S., 13, Briggate, Leeds.
Reynolds, Mr. T., Caerphilly, near Cardiff.
Reynolds, Mr. W. J., 21, Anne Street, Clonmel, Ireland.
Reynor, Mr. A., 50, Camden Street, Dublin.
Rhind, Mr. W. W., 69, Gloucester Road, Regent's Park, W.
Rhodes, G. W., M.R.C.S., 1, Queen's Street South, Huddersfield.
Rhodes, Mr. W. H., 74, Manwood Road, Leeds.
Rich, S. W., F.I.C., 23, Lloyd Square, W.C.
Rich, Mr. T., 11, Redcliffe Street, Bristol.
Richardson, B. W., M.D., F.R.S., 12, Hinde Street, W.
Richardson, Mr. G., 12, Norland Place, Notting Hill, W.
Richardson, J. G. F., Ph.D., Haughton House, Stoney Gate, Leicester.
Richardson, Mr. T. J., 23, London Road, Carlisle.
Richmond, Mr. R., junr., Leighton Buzzard, Beds.
Rickard, Mr. J. R., Wadebridge, Cornwall.
Ridd, Mr. A. H., 5, Windsor Terrace, Carlton Road, Peckham, S.E.
Riddell, H. B., F.C.S., Whitefield House, Rothbury, Morpeth.
Riddle, Mr. W. R., Market Place, Hexham.
Rimmington, F. M., F.C.S., Iregate, Bradford, Yorkshire.
Ringrose, Mr. G., 123, St. George's Street, E.
Ritson, Mr. T., 4, High Street, Sunderland.
Roach, Mr. P., 8, St. James's Street, S.W.
Robbins, J., F.C.S., 372, Oxford Street, W.
Roberts, Mr. G., High Street, West Bromwich.
Roberts, Mr. J., Middleton, Lancashire.
Roberts, Mr. J. C., Edon Road, Dolgelley, North Wales.
Roberts, Mr. M., High Street, Bangor.
Roberts, Mr. P., St. Asaph.
Robertson, Mr. J., 35, George Street, Edinburgh.
Robinson, Mr. A. E., 9, Bull Ring, Birmingham.
Robinson, Mr. A. F., 2, Northgate, Darlington.
Robinson, Mr. B., 1, Broad Street, Pendleton, Manchester.
Robinson, Mr. J., Orford Hill, Norwich.
Robinson, Mr. J., Stanley, near Chester-le-Street, Durham.
Robinson, Mr. J., East Terrace, Neasham Road, Darlington.
Robinson, Mr. J. F., Knowsley Buildings, Liverpool.
Robinson, Mr. J. Frodsham-, Frodsham, Cheshire.
Robinson, Mr. J. O., 1, Fair View Avenue, Clontarf, Co. Dublin.
Robinson, Mr. J. S., 1, Eversfield Place, St. Leonard's, Hastings.
Robinson, Mr. J. S., Alfreton.

Robinson, Mr. R., 58, Yorkshire Street, Rochdale.
Robinson, Mr. R. A., 195, Brompton Road, S.W.
Robinson, Mr. W., Main Street, Cockermouth.
Robson, Mr. J., 26, Scotch Street, Carlisle.
Robson, Mr. T., 4, Victoria Road, Brighton.
Rogers, Mr. A. R., Newmarket.
Rogers, Mr. W., 53, Ben Jonson Road, Stepney, E.
Rogerson, Mr. M., Hope Villa, Boston Spa, near Tadcaster, Yorkshire.
Romans, Mr. T. W., High Street, Wrotham, Sevenoaks.
Rookledge, Mr. J., Easingwold.
Roper, Mr. H. E., Oundle.
Rose, Mr. A., Apothecaries' Company, Sauchiehall Street, Glasgow.
Rose, Mr. J. D., 18, Ormonde Street, Jarrow-on-Tyne, Durham.
Ross, L. B., F.C.S., Great Driffield.
Ross, Mr. R., 43, High Street, Old Aberdeen.
Rossiter, Mr. F., 20, George Street, Hastings.
Rossiter, Mr. G., Bampton Street, Tiverton.
Rossiter, Mr. J., Royal Melville Hospital, Chatham.
Roulston, Mr. B. W., 39, Aire Street, Goole.
Rouw, Mr. W. T., Market Place, Ruthin.
Rowe, Mr. P. M., High Street, Marlborough.
Rowe, Mr. R., 40, Alfred Place West, South Kensington, W.
Rowe, S. T., M.A., Ph.D., Public Analyst, Redruth.
Rowell, Mr. R. H., Houghton-le-Spring.
Rowland, Mr. W., High Street, Wrexham.
Russell, Mr. C. J. L., Opposite the Castle Hill, Windsor.
Russell, Mr. J., 111, Nethergate, Dundee.
Rust, Mr. J., Thaxted, Essex.

Sainsbury, Mr. S., 176, Strand, W.C.
Salisbury, Mr. W. B., 3, Market Street, Leicester.
Salter, Mr. J. B., Castle Street, Shrewsbury.
Samson, Mr. E., 114, Redcliffe Street, Bristol.
Samuel, Mr. A. H., 62, Dale Street, Liverpool.
Sandford, Mr. G. W., 47, Piccadilly, W.
Sandiland, Mr. R. B., Bicester, Oxfordshire.
Sandy, Mr. F. W., 390, Walworth Road, S.E.
Sanger, Mr. W. A., 252, Oxford Street, W.
Sangster, Mr. A., 66, High Street, St. John's Wood, N.W.
Sapp, Mr. A., Winchester Street, Basingstoke.
Sargent, W. D., M.R.C.S., L.S.A., Albany Road, Camberwell, S.E.
Sarsfield, Mr. W., 7, Market Place, Durham.
Saunders, Mr. D. P., Haverfordwest.
Saunders, Mr. T. P., Bradford-on-Avon.
Savage, Mr. J. L., 140, Lister Hills Road, Bradford, Yorks.
Savage, Mr. J. W., Newton Abbot.
Savage, Mr. W. D., Park Road East, Brighton.
Savage, Mr. W. W., 65, Edward Street, Brighton.
Saville, Mr. J., 4, Goodramgate, York.
Savory, Mr. A. L., 143, New Bond Street, W.
Savory, Mr. J. F., 143, New Bond Street, W.
Saxby, Mr. H., jun., Lewes, Sussex.
Saxton, Mr. J., 2, St. Peter's Street, Leeds.
Sayer, Mr. E. C., Warrington House, Ipswich.
Schacht, G. F., F.C.S., 7, Regent Street, Clifton, Bristol.
Schacht, Mr. W., 6, Finsbury Place South, E.C.
Schmidt, Mr. A., 382, New City Road, Glasgow.
Schorlemmer, Prof. C., F.R.S., Owen's College, Manchester.
Schweitzer, J., F.C.S., 79, Pavilion Road, Sloane Street, S.W.
Scott, Mr. W., 46, Mary Street, Dublin.

Scott, W. L., F.C.S., County Analyst's Laboratories, Wolverhampton.
Scriven, J. S., M.D. (Brussels), L.R.C.P., L.R.C.S.E., Duffield, Derby.
Seaman, Mr. J. S., Marlow.
Seath, Mr. A., Dunfermline.
Selkirk, Mr. J., 7, Pembroke Street, Cork.
Selleck, Mr. E., Apothecaries' Hall, Blackfriars, E.C.
Sells, Mr. R. J., Tunbridge Wells.
Semple, Mr. J., Barr's Brae, Port Glasgow.
Senier, Dr. A., F.I.C., F.C.S., 17, Bloomsbury Square, W.C.
Sergeant, Mr. T. W., 61, Ashton Street, Liverpool.
Severs, Mr. J., 23, Stricklandgate, Kendal.
Seymour, Mr. T. T., Ennis.
Shapley, Mr. C., 11, Strand, Torquay.
Sharman, W., F.C.S., 247, Mare Street, Hackney.
Sharp, Mr. D. B., Toward Road, Sunderland.
Sharp, Mr. J., 5, Sedgefield Terrace, Bradford, Yorks.
Sharpe, Mr. G. Y., 34, High Street, Notting Hill, W.
Shaw, Mr. A., Riddings, Derbyshire.
Shaw, Mr. H. W. (Messrs. Dunhill, Son & Shaw), Doncaster.
Shaw, Mr. J., 24, Great George Place, Liverpool.
Shaw, Mr. J. W., 4, Edwardes Terrace, Kensington, W.
Shaw, Mr. R. H., 24, Brighton Street, Seacombe, Birkenhead.
Shelley, Mr. H., 2, Church Street, Twickenham.
Shenstone, Mr. J. C., 13, High Street, Colchester.
Shenstone, W. A., F.I.C., F.C.S., Exeter School, Exeter.
Shephard, Mr. T. F., 46, All Saints' Road, Westbourne Park, W.
Shepheard, Mr. T., 12, Bridge Street Row, Chester.
Shepherd, Mr. J., 144, Huddersfield Road, Oldham.
Sherlock, Mr. T., Market Place, St. Helen's, Lancs.
Shields, Mr. J., Alsager, Stoke-on-Trent.
Shipman, Mr. J. J., 22, Bridge Street, Northampton.
Shirtliff, Mr. W., 66, Goldhawk Road, Shepherd's Bush, W.
Short, Mr. E. C., Post Office, Bushey Heath.
Sidgwick, Mr. G. C., 9, Alexandra Terrace, Sunderland.
Sidley, Mr. T. I., Brunswick Terrace, Stafford.
Siebold, L., F.I.C., F.C.S., 18, Egerton Terrace, Stockport Road, Manchester.
Sillitoe, Mr. F. S., Station Road, Red Hill, Surrey.
Silson, Mr. R. W., 113, Church Street, Manningham, Bradford.
Silverlock, Mr. H. T., 92, Blackfriars Road, S.E.
Silvers, Mr. F. T., 19, Church Street, Camberwell, S.E.
Simmonds, Mr. P. L., 29, Cheapside, E.C.
Simms, Mr. R. J., 3, Ramshill Road, South Cliff, Scarborough.
Simpkins, Mr. J., Minchinhampton.
Simpson, Mr. A., 9, Melbourne Street, Stalybridge.
Simpson, Mr. G., Paikes Street, Alnwick, Northumberland.
Simpson, Mr. H. D., 2, New Street, Louth.
Simpson, Mr. J., South Lambeth Dispensary, Albert Square, Clapham Road, S.W.
Simpson, Mr. R., 16, Henry Street, Dublin.
Simpson, Mr. T., Bloxham, Banbury, Oxon.
Simpson, Mr. T., 6, Havelock Terrace, Forest Hill, S.E.
Sims, Mr. J., Hirwain.
Sims, Mr. W., 24, Lewis Street, Aberaman, Aberdare.
Sinclair, Mr. R., Invergordon, N.B.
Sindall, Mr. J. W., High Street, Knaresborough.
Sirett, Mr. H., Brackley, Northamptonshire.
Skinner, Mr. M. H., Keelby, near Ulceby, Lincs.
Skipper, Mr. E., 4, Dalston Lane, E.

Skirrow, Mr. W. E., Bingley, Yorks.
Skirving, Mr. G., 47, Lower High Street, Wednesbury, Staffs.
Skoulding, Mr. G. S. F., Church Plain, Yarmouth.
Skoulding, Mr. W., Wymondham, Norfolk.
Slack, Mr. J. K., Prescott.
Slade, Mr. J., Tenbury.
Slater, Mr. J., 76, Bedford Street, Leicester.
Slater, Mr. J., Sadler Street, Wells, Somerset.
Slater, Mr. T., Stone, Staffordshire.
Slinger, Mr. F., High Ousegate, York.
Slingsby, Mr. C. S., Bridge Street, Hindley.
Smeeton, Mr. W., 26, Commercial Street, Leeds.
Smiles, Mr. J., 1, Henderson Row, Edinburgh.
Smith, Mr. A. W., 93, High Street, Rye, Sussex.
Smith, Mr. C. S., Cirencester.
Smith, Mr. D., Market Place, Stroud, Gloucestershire.
Smith, E., F.C.S., 8, The Strand, Torquay.
Smith, F. C., M.D., 21, Notting Hill Terrace, W.
Smith, Mr. J., 46, Broad Street, Ross, Herefordshire.
Smith, Mr. J. B., Dulwich, S.E.
Smith, Mr. J. S., 8, Crowhurst Road, Brixton, S.W.
Smith, Mr. J. S. T. W., 46, Charles Street, Horsely Down, S.E.
Smith, Mr. J. T., 12, Down Street, Piccadilly, W.
Smith, Mr. J. W., Mrs. Haselar's, Stone Street, Cranbrook, Kent.
Smith, Mr. N., 372, High Street, Cheltenham.
Smith, Mr. P. S., 21, Duke Street, Edinburgh.
Smith, R., M.D., Durham County Asylum, Sedgefield, Ferryhill.
Smith, Mr. R. B., Market Place, Norwich.
Smith, Mr. S. A., 102, Parade, Leamington.
Smith, T., L.R.C.S.E., Heriot Hill House, Edinburgh.
Smith, Mr. T., Top of Union Street, Ryde, Isle of Wight.
Smith, Mr. W., 157, Friargate, Preston.
Smith, Mr. W., Market Place, Nottingham.
Smith, Mr. W., 48, Porchester Road, W.
Smith, Mr. W., Sutton Coldfield.
Smith, Mr. W. F., 280, Walworth Road, S.E.
Smith, Mr. W. H., 36, St. George's Road, Brighton.
Snape, Mr. E., Great Hampton Street, Birmingham.
Soames, Mr. W., Wargrave, near Henley-on-Thames.
Souter, J. C., M.D., F.C.S., 88, Junction Road, Highgate, N.W.
Southall, A., F.C.S., Bull Street, Birmingham.
Southall, Mr. W., Bull Street, Birmingham.
Soutter, Mr. J. S., Hedon, Hull.
Spear, Mr. G., 150, Queen Street, Portsea.
Spearing, Mr. J., 53, Above Bar, Southampton.
Speechly, Mr. G., North Street, Bishop Stortford.
Spencer, Mr. T., London House, South Street, Sleaford, Lincs.
Spencer, Mr. W. A. C., 108, Patrick Street, Cork.
Spilsbury, Mr. J., 33, Bath Street, Leamington.
Sprackett, Mr. G., The Drawbridge, Bristol.
Spyer, Mr. N., 29, Chapel Street, Belgrave Square, S.W.
Squire, Mr. A., 1, Bush Lane, E.C.
Squire, Mr. A. H., 277, Oxford Street, W.
Squire, Mr. F. J. C., St. Austell.
Squire, Mr. J., 41, Queen Street, Oxford.
Squire, P., F.L.S., 277, Oxford Street, W.
Squire, Mr. P. W., 277, Oxford Street, W.
Squire, Mr. W., 5, Coleman Street, E.C.
Stable, Mr. R. H., 64, Park Street, Southwark.

Stacey, G. H., F.C.S., 300, Holborn, W.C.
Stacey, Mr. S. Ll., 300, Holborn, W.C.
Stafford, Mr. W., 10, Northgate Street, Gloucester.
Stainer, Mr. J., 59, Sandgate Road, Folkestone.
Stainer, Mr. R. W., 84, St. James's Road, Southsea, Hants.
Stainthorpe, W. W., M.D., C.M., Wickham Market, Suffolk.
Stamp, Mr. E. B., 29, High Street, Hampstead, N.W.
Standring, Mr. J., 1, Piccadilly, Manchester.
Stanford, E. C. C., F.C.S., Thornloe, Partick Hill, Glasgow.
Staning, Mr. W., 55, Cogan Street, Hull.
Stanley, Mr. R. S., Southwell, Notts.
Stannard, Mr. F. J., 15, Broad Green, Croydon.
Stansfield, Mr. R., 85, Haverstock Hill, N.W.
Stanswood, Mr. J., 277, Commercial Road, Landport.
Stanway, Mr. W. H., Kington, Herefordshire.
Staples, Mr. C. A., 47, High Street, Fulham, S.W.
Staples, Mr. E., West Street, Wilton.
Starkie, Mr. R. S., 441, Strand, W.C.
Staunton, Mr. G. H., Portarlington, Queen's Co.
Stead, Mr. T., New Briggate, Laisterdyke.
Stead, Mr. T. B., 20, Upperhead Row, Leeds.
Steel, Mr. F. W., 283, Liverpool Road, Islington, N.
Steele, Mr. J. C., 4, Harmony Place, Govanhill.
Stenhouse, Dr. J., F.R.S., F.I.C., 17, Rodney Street, Pentonville, N.
Stenson, Mr. J., High Street, Camden Town, N.W.
Stephenson, Mr. F., 16, Howe Street, Edinburgh.
Stephenson, Mr. J. N., High Street, Heckmondwike.
Sterriker, Mr. J., Driffield.
Sterling, Mr. W., Rose Inn Street, Kilkenny, Ireland.
Stevens, Mr. F., 51, Judd Street, Euston Road, W.C.
Stevens, Mr. J., High Street, Broseley, Salop.
Stevens, Mr. P. A., 70, Hyde Road, Hoxton, N.
Stevenson, Mr. R., Victoria Street, Derby.
Stevenson, T., M.D., F.C.S., F.I.C., Sandhurst Lodge, Gresham Road, Brixton, S.W.
Stevenson, Mr. W., The Crescent, Todmorden.
Stevenson, Mr. W. L., 165, Edgware Road, W.
Steward, Mr. J., Broad Street, Kingswinford, Staffs.
Stewart, A. D., M.B., 39, Regent Street, Greenock.
Stewart, A. Y., F.I.C., F.C.S., Apothecaries Hall, Blackfriars, E.C.
Stewart, Mr. E. H., 42, Long Street, Devizes.
Stewart, G. C., F.C.S., Sugar Refiner, Greenock.
Stewart, Mr. J., 8, Cadzow Street, Hamilton.
Stiell, Mr. G., Dunfermline.
Stiles, Mr. M. H., 2, French Gate, Doncaster.
Stoakes, Mr. B. M., 16, Whitefriargate, Hull.
Stoddart, Mr. J., 14, Grace Terrace, Chester Road, Sunderland.
Stoddart, W. W., F.I.C., F.C.S., Western Counties Laboratory, Bristol.
Stoddart, Mr. W. W. B., Grafton Lodge, Sneyd Park, Bristol.
Stoker, G. N., F.I.C., The Laboratory, Somerset House, W.C.
Stone, Mr. F. W., 166, Fore Street, Exeter.
Stone, Mr. J. J., Devonshire House, Alton.
Stoney, Mr. J. D., 67, Talbot Street, Dublin.
Storey, Mr. E. H., 42, Castle Street East, Oxford Street, W.
Storrar, Mr. D., 228, High Street, Kirkcaldy.
Stott, W., Ph.D., Sowerby Bridge.
Strachan, Mr. A., 111, George Street, Aberdeen.
Strangroom, Mr. F., Cley-next-the-Sea, Dereham, Norfolk.
Strawson, Mr. G. F., 99, Woodstock Road, Finsbury Park, N.

Street, Mr. G., 97, Old Street, St. Luke's.
Strickett, Mr. J., 161, St. George's Road, Peckham, S.E.
Strongitharm, Mr. W. G., 132, Loampit Vale, Lewisham, S.E.
Stroud, Mr. J., 23, Wine Street, Bristol.
Stuart, Mr. J. E., 172, New Bond Street, W.
Sugden, Mr. S., Waterfoot, near Manchester.
Sumner, Mr. R., 50A, Lord Street, Liverpool.
Sunner, Mr. R., 108, Patrick Street, Cork.
Sutcliffe, Mr. J., 154, Larkhall Lane, Clapham, S.W.
Sutterby, Mr. J. N., Long Sutton, Lincs.
Sutton, F., F.I.C., F.C.S., Bank Plain, Norwich.
Swaine, Mr. J., 158, Bolton Road, Bradford.
Swan, J. W., F.I.C., F.C.S., 15, Mosley Street, Newcastle-on-Tyne.
Swenden, Mr. J., 14, High Row, Darlington.
Swift, Mr. T. N., 38, Cross Church Street, Huddersfield.
Swift, Mr. W. P., Raunds, near Thrapstone, Northamptonshire.
Swingburn, Mr. R. H., 33, Broad Street, South Molton, Devon.
Swinn, Mr. C., 125, Upper Moss Lane, Hulme, Manchester.
Swinnerton, Mr. W., 70, High Street, Princes End, Tipton.
Sykes, E. J., F.M.S., 5, The Quadrant, Buxton, Derbyshire.
Sykes, Mr. T. H., Church Street, Southport.
Symes, Dr. C., 14, Hardman Street, Liverpool.
Symington, Mr. T., 4, Dundas Street, Edinburgh.
Symons, W., F.C.S., 26, Joy Street, Barnstaple.
Symons, W. H., F.C.S., 2, Queen's Terrace, St. John's Wood, N.W.

Tait, L., F.R.C.S., 7, Great Charles Street, East Row, Birmingham.
Tamplin, Mr. E. C., Kingston-on-Thames.
Tanner, Mr. A. E., 128, Prescott Road, Fairfield, Liverpool.
Taaffe, Mr. H., Londonderry.
Taplin, Mr. W. G., 75, Hampstead Road, N.W.
Targett, Mr. C. G., 53, St. Thomas Street, Weymouth.
Tate, Mr. J. L., 51, Ellerby Lane, Leeds.
Taubman, Mr. R., 33, Southampton Row, W.C.
Taylor, Mr. A., 37, South Clerk Street, Edinburgh.
Taylor, Mr. C., 10, Cleveland Square, Liverpool.
Taylor, Mr. C. W., 300, Holborn, W.C.
Taylor, Mr. E., 24, Yorkshire Street, Rochdale.
Taylor, Mr. E., St. George's Square, Droitwich.
Taylor, Mr. G. S., 13, Queen's Terrace, St. John's Wood, N.W.
Taylor, Mr. J., 13, Baker Street, W.
Taylor, Mr. J. H., James Street, Harrogate.
Taylor, Mr. S., 70, Great George Street, Leeds.
Taylor, Mr. T., Newport Pagnell.
Taylor, Mr. T., 81, High Street, Peckham, S.E.
Taylor, Mr. W. G., Hungerford, Berks.
Taylor, Mr. W. G., Charford Mill, Bromsgrove.
Teed, Mr. D., 38, Strand, Exmouth.
Telfer, Mr. H. V., Leytonstone, Essex.
Tennent, Dr. G. P., 120, Bath Street, Glasgow.
Terry, Mr. T., 1, Egerton Crescent, Withington, Manchester.
Thatcher, Mr. T., 290, Catherine Street, Ashton-under-Lyne.
Thomas, Mr. H., 7, Upper St. Martin's Lane, W.C.
Thomas, Mr. J., Bridge, Canterbury, Kent.
Thomas, Mr. J., Machynlleth.
Thomas, Mr. J. D. D., 144, Ashley Road, Bristol.
Thomas, Mr. J. J., Garstans, Lancs.
Thomas, Mr. R., Burnley.
Thomas, Mr. R., 143, High Street, Merthyr.

Thomas, Mr. W. J., 9, Commercial Place, Aberdare.
Thompson, Mr. A., 51, English Street, Carlisle.
Thompson, Mr. C. H., Maidenhead.
Thompson, Mr. G., Alston.
Thompson, Mr. H., 101, Southwark Street, S.E.
Thompson, Mr. H. A., 22, Worship Street, Finsbury Square, E.C.
Thompson, Mr. H., 8, Moor Street, Sunderland.
Thompson, Mr. J., 11, Aldersgate Street, E.C.
Thompson, Mr. J., High Street, Knaresboro', Yorkshire.
Thompson, Mr. J. W., Bull Ring, Sedley, near Dudley.
Thompson, Mr. L., Richmond, Yorks.
Thompson, Mr. L., Lisnaskea, Ireland.
Thompson, Mr. S. M., Carmichael School of Medicine, Dublin.
Thompson, Mr. W. M., 31, Coney Street, York.
Thomson, W., F.R.S.E., F.I.C., Royal Institution, Manchester.
Thonger, Mr. G., Harborne, Birmingham.
Thorburn, Mr. H., 3, Newgate Street, Bishop Auckland.
Thorn, Mr. J. J., 338, Oxford Street, W.
Thornley, Mr. C., Carshalton, Surrey.
Thornton, Mr. H., 136, Leeds Road, Bradford.
Thornton, Mr. S., Beacon, Exmouth, Devon.
Thorp, W., junr., B.Sc., F.I.C., 39, Sandringham Road, Kingsland, E.
Thresh, J. C., F.C.S., Buxton, Derby.
Thrower, Mr. E. A., Diss.
Thurland, Mr. H., 41, St. Giles Road, Oxford.
Thurlby, Mr. G., High Street, Gorleston, Great Yarmouth.
Thurlow, Mr. H., Ixworth, Suffolk.
Tibbles, Mr. W., Wanlip Road, Syston, Leicestershire.
Tibbs, Mr. F., 81, Chalk Farm Road, N.W.
Tice, Mr. R., St. Stephen's, Norwich.
Tichborne, Prof. C. R. C., Ph.D., F.I.C., F.C.S., 40, Mary Street, Dublin.
Tidman, Mr. W., 21, Wilson Street, Finsbury, E.C.
Tilden, W. A., D.Sc., F.I.C., F.C.S., Clifton College, Bristol.
Tilsley, Mr. J., Berriew, Montgomeryshire, North Wales.
Tily, Mr. C. A., 45, Maida Vale, W.
Tippett, Mr. B. M., 3, Sloane Street, S.W.
Tipping, Mr. T. J. W., 155, High Street, Stoke Newington, N.
Tipton, Mr. St. J., St. George's, Wellington, Salop.
Tirrell, Mr. J., Market Square, Hanley.
Titley, Mr. T., 44, Charlotte Street, Fitzroy Square, W.
Tod, Mr. J., 127, Gosford Street, Coventry.
Todd, Mr. J., English Street, Carlisle.
Todd, Mr. T., Colinsburgh, N.B.
Tollinton, Mr. R. B., Colliergate, York.
Tomlinson, Mr. H. J., Barton-on-Humber.
Tomlinson, Mr. J. C., 97, Fishergate, Preston, Lancs.
Toone, Mr. J. A., 2, Montpellier Exchange, Cheltenham.
Toone, Mr. J. H., 82, Granby Street, Leicester.
Toone, Mr. J. V., 14, New Bond Street, Bath.
Towerzey, Mr. A., 7, Regent Street, Clifton, Bristol.
Townsend, Mr. C., 4, Union Street, Bristol.
Tremeer, Mr. J. J., 65, Boutport Street, Barnstaple.
Trick, Mr. W. B., Green Lanes, Stoke Newington, N.
Trim, Mr. E., 9, Wellington Terrace, Bournemouth, Hants.
Tritton, Mr. C., 7, Regent Street, Clifton, Bristol.
Troake, Mr. M. H., Helston, Cornwall.
Troake, Mr. R. J., 126, White Ladies' Road, Clifton, Bristol.
Troake, Mr. W. H., Kingsbridge, Devon.
Troke, Mr. C., 76, Laurel Grove, Penge.

Trotman, Mr. A. C., 16, Cambridge Street, Hyde Park Square, W.
Trotter, Mr. J., East Linton, Prestonkirk.
Troughton, Mr. C., 72, Old Hall Street, Liverpool.
Truman, Mr. H. V., 14, Grosvenor Road, South Norwood, S.E.
Tuck, Mr. G. F., Fore Street, Tiverton, Devonshire.
Tuck, Mr. W. B., Address unknown.
Tucker, Mr. C., Bridport.
Tucker, Mr. H. S., 139, Great Hampton Row, Birmingham.
Tucker, Mr. R. L., 9, North Street, Bristol.
Tully, Mr. J., senr., Glen Vue Works, East Grinstead, Sussex.
Tupholme, Mr. E. H., 394, King's Road, Chelsea, S.W.
Tupholme, Mr. J. T., 1, Coleherne Terrace, West Brompton, S.W.
Turner, Mr. C. E., 63, Great Russell Street, W.C.
Turner, Mr. G., Honiton.
Turner, H., M.R.C.S., Toad Lane, Rochdale.
Turner, Mr. J., Chemical Works, Queen's Ferry, Flintshire.
Turner, Mr. J., Beaumont Street, Hexham.
Turner, Mr. J., Kingsbury Square, Aylesbury.
Turner, Mr. J. K., Cleator Moor, *via* Carnforth, Cumberland.
Turner, Mr. R., Oundle, Northamptonshire.
Turney, Mr. S. B., 183, Union Street, Plymouth.
Turton, Mr. R. C., 70, Lansdown Road, Clapham, S.W.
Tuson, Prof. R. V., F.I.C., Royal Veterinary College, Camden Town, N.W.
Twaddle, Mr. R., 34, Maitland Street, Glasgow.
Twemlow, Mr. R., 91, Upper Brook Street, Manchester.
Twinberrow, Mr. J., 53, Broad Street, Worcester.
Tyler, Mr. T., High Street, Stourport.
Tyrer, T., F.I.C., F.C.S., Garden Wharf, Battersea, S.W.

Umney, C., F.I.C., F.C.S., 50, Southwark Street, S E.
Upton, Mr. E. J., Wallingford, Berks.
Urwick, Mr W. W., 60, St. George's Road, Pimlico, S.W.

Vanee, Mr. J. N., Bray, Co. Wicklow.
Vance, Mr. W. N., Bray, Co. Wicklow.
Vaughan, Mr. W. G., 51, North Parade, Aberystwith.
Vennall, Mr. G., Cranleigh, Guildford.
Verity, Mr. R., 35, Warwick Street, Regent Street, W.
Vinee, Mr. J., 37, Cheapside, Lancaster.
Virgo, Mr. C., The Foregate, Worcester.
Vizer, Mr. E. B., Belgrave House, Church Road, Cliftonville, Brighton.
Voce, Mr. W. G., 52, Haleswen Road, Netherton, near Dudley.
Voelcker, Dr. A., F.R.S., 39, Argyll Road, Kensington, W.

Wade, Mr. W., 6, Lewisham High Road, New Cross, S.E.
Wakefield, Mr. C. H., Blackmore House, Malvern Wells.
Wakeham, Mr. C., Helston.
Walkden, Mr. J., 8, Wesley Street, Higher Tranmere, Cheshire.
Walker, Mr. B. W., 26, Clapham Road, S.W.
Walker, Mr. C., 8, Cannon Street Road, E.
Walker, Mr. J., 200, Manchester Road, Bradford, Yorkshire.
Walker, Mr. J. D., 1, Abbey Street, Carlisle.
Walker, J. F., M.A., F.I.C., F.C.S., 16, Gilligate, York.
Walker, Mr. T., Uddingston, near Glasgow.
Wallace, Mr. W., 71, St. Vincent Street, Glasgow.
Wallwork, Mr. J., 94, Elliott Street, Tyldesley, near Manchester.
Walpole, Mr. W., White Lion Road, Yarmouth.
Walters, Mr. J., 26, Patrick Street, Kilkenny, Ireland.
Walton, Mr. J., 298, High Street West, Sunderland.

Walton, Mr. M. F., Sowerby Bridge.
Walton, Mr. R., High Street, Maidenhead.
Wand, Mr. S., 18, Haymarket, Leicester.
Ward, G., F.I.C., F.C.S., Mechanics' Institution, Leeds.
Ward, Mr. J., 39, Eastgate Street, Gloucester.
Ward, Mr. J. S., 40, Aldersgate Street, E.C.
Ward, W., F.C.S., South Street, Sheffield.
Warneford, Mr. F., 50, Queen's Road, Brighton.
Warner, Mr. C. H., 55, Fore Street, E.C.
Warner, Mr. G. T., 1, Mall, Clifton, Bristol.
Warrell, Mr. E., 202, Caledonian Road, N.
Warren, Mr. G., 15, Guilford Road, Brighton.
Warriner, Mr. C. W., Corner Union Road, St. Ann's Well Road, Nottingham.
Warrior, Mr. H., Northallerton.
Warwick, Mr. D. H., Milbank Crescent, Hartlepool.
Wastie, Mr. F., 183, Lower Kennington Lane, S.E.
Waterall, Mr. G. E., Chapel Bar, Nottingham.
Waterhouse, Mr. J., Stamford Buildings, Ashton-under-Lyne.
Waters, Mr. H. G., Emsworth, Hants.
Watkins, Mr. W. H., 19, Castle Street, Tredegar.
Watkinson, Mr. J. W., Market Street, Farnworth, Bolton.
Watson, Mr. D., Park Crescent, Torquay.
Watson, Mr. J. (Messrs. Hirst & Co.), Aire Street, Leeds.
Watson, Mr. J. E. H., Rose Corner, Norwich.
Watson, Mr. J. H., 30, Saltaire Road, Shipley, Leeds.
Watson, Mr. M., 33, Prudhoe Street, Newcastle-on-Tyne.
Watson, Mr. R. T., 63, Ormonde Street, Jarrow.
Watson, Mr. T. D., 23, Cross Street, Finsbury, E.C.
Watts, Mr. C. C., Cliftonville, Brighton.
Watts, J., D.Sc., F.I.C., F.C.S., 57, Baker Street, W.
Watts, Mr. J., Dudley Hill, Bradford, Yorks.
Watts, Mr. L. R., 175, Pond Street, Sheffield.
Watts, Mr. W., 10, Bedford Terrace, Kensington, W.
Watts, Mr. W. M., 32, Lower Whitecross Street, E.C.
Watts, W. M., D.Sc., F.C.S., Giggleswick Grammar School, Settle, Yorks.
Waugh, Mr. J., 178, Chapel Street, Salford.
Wealthall, Mr. A., 156, Great Jackson Street, Hulme, Manchester.
Weaver, Mr. T., The Dispensary, Paradise Street, Birmingham.
Webb, Mr. E. A., Salisbury House, Turnham Green, W.
Webber, Mr. C. F., Market Place, Sidmouth, Devon.
Webster, Mr. E. P., Dispensary Lane, Newcastle-on-Tyne.
Webster, Mr. S. M., 33, Bridge Street, Warrington.
Welberry, Mr. G., Bridge Gate, East Retford.
Welborn, Mr. G., The Dispensary, Grantham.
Welch, Mr. C., 161, King's Road, Reading.
Welch, Mr. T., 29, Mosley Street, Newcastle-on-Tyne.
Wells, Mr. T., 2, Shirland Road, Maida Vale, W.
Wells, Mr. W. F., junr., 52, Upper Sackville Street, Dublin.
Welton, Mr. H., 5, Bishop Street, Coventry.
West, Mr. E. R., 17, Strand, Dawlish.
West, Mr. T., 61, Chester Road, Stretford, Manchester.
West, Mr. W., 15, Horton Lane, Bradford.
Westlake, Mr. J., 4, High Street, Sutton.
Weston, Mr. C., 4, Regent's Parade, Mill Street, Ventnor, Isle of Wight.
Weston, Mr. G., South Street, Sleaford, Lincs.
Weston, Mr. S. J., 151, Westbourne Terrace, W.
Westrup, Mr. J., 76, Kensington Park Road, W.
Wheeldon, Mr. J., 241, Stockport Road, Manchester.
Wheeler, Mr. J. W., 1, Jermyn Street, St. James's, S.W.

Whewell, G., F.I.C., F.C.S., Exchange Chambers, Blackburn.
While, Mr. W. J., 123, London Street, Reading.
Whincup, Mr. W., 404, Essex Road, Islington, N.
White, Mr. E. A., Mayfield, Sussex.
White, Mr. F., London Road, Nottingham.
White, Mr. G. H., 39, Commercial St., Mountain Ash, Glamorganshire.
White, Mr. J. W., 52, Royal York Crescent, Clifton, Bristol.
White, Mr. W., 15, Westgate, Bradford, Yorks.
Whitfield, Mr. H., 45, High Street, Worcester.
Whitfield, J., F.C.S., 113, Westbro', Scarborough.
Whitford, Mr. J. G. P., 20, Mardyke Parade, Cork.
Whitla, Mr. J., Monaghan, Ireland.
Whittaker, Mr. E., 32, Regent Road, Salford, Lancs.
Whittle, Mr. S., Leigh, Lancashire.
Whittles, Mr. H., 44, Wheeler Street, Lozells, Birmingham.
Whysall, Mr. W., Grantham.
Whyte, Mr. J. S., 15, Marshall Street, Edinburgh.
Whyte, Mr. W., 110–112, Trongate, Glasgow.
Wiggin, J., F.C.S., 34, St. Matthew's, Ipswich.
Wiggins, Mr. H., Oak House, Blue Anchor Road, Bermondsey, S.E.
Wild, Mr. F., 299, Oxford Street, Manchester.
Wild, Mr. J., Clarendon Place, Hyde, Cheshire.
Wilday, Mr. G. E., Address unknown.
Wildsmith, Mr. E., 94, West Street, Leeds.
Wiles, Mr. E., 1, Mitchell Street, Sheffield.
Wilford, Mr. J., 7, Lower Parliament Street, Nottingham.
Wilkes, Mr. J. S., 16, Sparkenhoe Street, Leicester.
Wilkinson, Mr. B. J., 1, Middleton Road, Kingsland, E.
Wilkinson, Mr. G., 267, Waterloo Road, Manchester.
Wilkinson, Mr. T., 270, Regent Street, W.
Wilkinson, Mr. W., 114, Lambeth Walk, S.E.
Wilkinson, Mr. W., Hope Street, Crook, Durham.
Wilkinson, Mr. W., 263, Cheetham Hill, Manchester.
Wilkinson-Newsholme, Mr. G. T., 74, Market Place, Sheffield.
Wilks, Mr. M., 70, Market Place, Burnley, Lancs.
Willan, Mr. R., 5, Market Street, Ulverston.
Willan, Mr. W., 3, Friargate, Preston, Lancs.
Williams, Mr. C. J., 4, St. John's, Warwick.
Williams, Mr. E., Cerrig-y-Druidion, Denbighshire.
Williams, Mr. E., Milkwood Road, Brixton.
Williams, Mr. E., 10, Wrexham Street, Mold.
Williams, Mr. G. L., Burnham, Somerset.
Williams, Mr. H. W., 1, High Street, Barmouth.
Williams, J., F.I.C., F.C.S., 16, Cross Street, Hatton Garden, E.C.
Williams, Mr. J., 72, Camp Hill, Birmingham.
Williams, Mr. J. D., Turret House, Bodmin, Cornwall.
Williams, Mr. J. J., 13, Desboro' Place, Harrow Road, Paddington, W.
Williams, Mr. J. Y., St. Alban's House, Weymouth.
Williams, Mr. R., St. Clears, Carmarthenshire.
Williams, Mr. R., 324, Coldharbour Lane, Brixton, S.W.
Williams, Mr. T., 11, Bute Street, Cardiff.
Williams, Mr. W., 265, Crown Street, Liverpool.
Williams, Mr. W. H., 13, Upper Baker Street, W.
Williams, Mr. W. H., Hayle.
Williams, Mr. W. J., 137, Cannon Street, E.C.
Willis, Mr. B. W., 59, High Street, Evesham.
Willmott, Mr. W., King's College Hospital, W.C.
Willmott, Mr. W., The Brewery, Sheffield.
Wills, Mr. G. V. S., 62, Lambeth Road, S.E.

Willsher, Mr. S., High Street, Tenterden.
Wilson, Mr. C. F., 23, Liverpool Road, Stoke-on-Trent.
Wilson, Mr. G., 40, Cathcart Street, Greenock, N.B.
Wilson, Mr. H., 19, Rusholme Road, Manchester.
Wilson, Mr. J., General Infirmary, Derby.
Wilson, Mr. J., Penrith, Cumberland.
Wilson, Mr. J. H., 5, West Park, Harrogate.
Wilson, Mr. J. P., 115, London Street, Reading.
Wilson, Mr. R., Clay Cross, Chesterfield.
Wilson, Mr. T., Stowmarket.
Wilson, Mr. W., 21, High Street, Hanley, Staffordshire.
Wing, Mr. G. N., Melton Mowbray.
Wing, Mr. Lewis, Chislehurst, W., Kent.
Wink, Mr. J. A., 5, Barge Yard, Bucklersbury, E.C.
Wood, Mr. A., New Brentford.
Wood, Mr. E. B., 46, Holloway Head, Birmingham.
Wood, Mr. R., 25, Mill Street, Macclesfield.
Wood, Mr. W. A., 81, Church Street, Hunslet, Leeds.
Woodcock, Mr. J., 15, Southgates, Leicester.
Woodcock, R. C., F.I.C., F.C.S., 23, Abingdon Street, Westminster.
Woodhead, Mr. J. T., 29, Paradise Street, Liverpool.
Woodhead, W. H., M.D., N.Y., 58, Grosvenor Street, Manchester.
Woodland, Mr. J., 52, Alexandra Road, Cambridge June., Kilburn, N.W.
Woodland, Mr. W. F., Chard, Somersetshire.
Woodward, Mr. J. L., Bridgewater.
Woolcott, Mr. C., 49, Upper Parade, Leamington.
Woolley, Mr. G. S., 69, Market Street, Manchester.
Woolley, Mr. Hermann, 69, Market Street, Manchester.
Woolrich, Mr. C. B., Uttoxeter, Staffs.
Wooster, Mr. J. R., 4, Broadway, Turnham Green, W.
Wootton, Mr. A. C., Grove House, Shacklewell, E.
Wootton, Mr. P., George Street, Luton, Beds.
Worfolk, Mr. F., 57, Bridge Street, Bolton.
Worth, Mr. E., Town Hall, Bournemouth.
Worthington, J. P., L.R.C.P., L.R.C.S., Edin., Russell Road, Garston.
Worthington, Mr. W., 2, Camden Place, Preston.
Wright, Mr. A., 109, High Street, Lowestoft.
Wright, Mr. A., A.K.C., 441, Strand, W.C.
Wright, C. R. A., D.Sc., F.I.C., F.C.S., St. Mary's Hospital, W.
Wright, Mr. G., 102, High Street, Burton-on-Trent.
Wright, Mr. G., 29, Congreve Street, Birmingham.
Wright, Mr. G. H., 103, Boro' High Street, S.E.
Wright, Mr. J., 165, King Street, Yarmouth.
Wright, Mr. W. F., 30, Regent Street, Leamington.
Wright, Mr. W. O., 55, Great Scotland Road, Liverpool.
Wyatt, Mr. H., 29, Derby Road, Bootle, Liverpool.
Wyke, Mr. J., 51, Cross Street, Abergavenny.
Wyles, Mr. W., 338, Oxford Street, W.
Wyley, Mr. J., Coventry.
Wyley, Mr. W. F., Hertford Street, Coventry.
Wyllie, Mr. A., 287, High Street, Glasgow.
Wyman, Mr. J., 122, Fore Street, Cripplegate, E.C.
Wynne, Mr. E. P., 3, Pier Street, Aberystwith.

Yates, Mr. F., 64, Park Street, Southwark, S.E.
Yeomans, Mr. J., Sydney Street, Cambridge.
Yewdall, Mr. E., 56, Wade Lane, Leeds.
Young, Mr. A., Address unknown.
Young, C., F.R.C.S., Edin., 50, Ann Street, Dundee.

Young, Mr. D., Park Street, Cirencester.
Young, Mr. J., 16, Gallowtree Gate, Leicester.
Young, Mr. J., 20, High Street, Newport, Mon.
Young, Mr. J., Folds Road, Bolton.
Young, J. R., F.C.S., Sankey Street, Warrington.
Young, Mr. J. R., 17, North Bridge, Edinburgh.
Young, Mr. R. F., New Barnet.
Young, Mr. W., 8, Neeld Terrace, Harrow Road, W.

NOTICE.

Members will please report any inaccuracies in these lists to

PROFESSOR ATTFIELD, *Hon. Gen. Sec.*,

17, *Bloomsbury Square,*

London, W.C.

BRITISH PHARMACEUTICAL CONFERENCE. 1878-9.

ALPHABETICAL LIST OF TOWNS AT WHICH MEMBERS RESIDE.

The names to which an asterisk is attached are those of Local Secretaries.
For Alphabetical List of Names, see page 398.

Aberayron.
Jones, J. P.

Aberdare.
Sims, W.
Thomas, W. J.

Aberdeen.
Davidson, C.
McGregor, G. (Ellon.)
Rattray, W.
Strachan, A.

Aberdeen (Old).
Ross, R.

Abergavenny.
Wyke, J.

Abergele.
Lloyd, E., jun.

Aberystwith.
Davies, D. J.
Davies, J. H.
Vaughan, W. G.
Wynne, E. P.

Accrington.
Astin, E.
Cooper, M. (Church.)

Airdrie, N.B.
Harvie, J.

Alfreton.
Robinson, J. S.

Alnwick.
Newbigin, J. L.
Simpson, G.

Alston.
Thompson, G.

Alton.
Stone, J. J.

Altrincham.
Hughes, E.

Alva (Stirlingshire).
McNicol, J.

Ambleside.
Bell, T.

Anerley.
Bullock, F.

Appleby.
Longrigg, J.

Arbroath.
Buru, D. H.
Ogilvie, W. O.

Ardrossan.
Gemmell, H.

Armagh.
Hillock, J.

Arundel.
Price, T. U.

Ashby-de-la-Zouch.
Cooper, A.
Johnson, S. E.

Ashford, Kent.
Ingall, J.

Ashton-under-Lyne.
Belfield, W.
*Bostock, W.
Hirst, J.
Thatcher, T.
Waterhouse, J.

Atherstone.
Orme, W.

Athy.
Conolly, S. J.

Axminster.
Gunn, F. J.

Aylesbury.
Clift, H.
Turner, J.

Ayr.
Burns, W.

Bacup.
Mace, J

Ballycroy.
Croly, T. H.

Ballymena
Beatty, J.

Bampton.
Gare, W.

Banbury.
Simpson, T. (Bloxham.)

Banchory.
Lunan, A.

Bangor.
Roberts, M.

Barmouth.
Williams, H.

Barnard Castle.
Gardner, W.
Gibson, B. W.

Barnsley.
Iberson, J.

Barnstaple.
Goss, S.
Symons, W.
Tremeer, J. J.

Barrow.
Willan, R.

Barton-on-Humber.
Tomlinson, H. J.

Basingstoke.
Sapp, A.

Bath.
Appleby, E. J.
Barnitt, F.
Brooke, C.
Commans, R. D.
Ekin, C.
Hillier, H.
Hughes, J. E.
Humby, L. W.
Marsh, J. H.
Merrikin, J. B.
Toone, J. V.

Bathgate.
Frieland, J.

Beccles.
Count, S.

Beckenham, Kent.
Day, T. S.

Bedale.
Bellamy, R.
Hawkin, J.

Bedford.
Cuthbert, J. M.
Norman J. S.

Beeston.
Faull, E.

Belfast.
Ball, T.
Clotworthy, S.
Coulter, J.
Dobbin, W.
Gosgar, J. J.
Haslett, J. H.
Hodges, J. F.
Hodges, J. F. W.
McMullen, F.
Payne, J. C. C.
Pring, R. W.

Belper, Derby.
Barkinshaw, W. T.

Berriew.
Tilsley, J.

Berwick-on-Tweed.
Carr, W. G.

Betley, Staffs.
Place, F. W.

Beverley.
Hobson, C.

Bewdley.
Newman, R.

Bicester.
Sandiland, R. B.

Biggleswade.
Maxwell, G. N.

Bilston.
Gray, C.
Kearnes, R. H.
Lloyd, G. H.

Bingley, Yorks.
Perfect, R.
Skirrow, W. E.

Birkenhead.
Bennett, H.
Cooke, W. K.
*Dutton, J.
Fawcett, J.
Foulkes, W. J.
Mullock, R.
Nicholson, H.
Shaw, R. H.

Birmingham.
Arblaster, C. J.
Atkins, W. S.
Barclay, T.
Bates, J.
Clayton, F. C.
Dewson, S.
Foster, J. A.
Grady, F.
Haydon, W. F.
Holdsworth, T. W.
Kimberley, W.
Miller, W. C.
Oxborrow, E.
Palethorpe, S.
Perry, G. E.
Robinson, A. E.
Snape, E.
Southall, A.
Southall, W.
Tait, L.
Thonger, G.
Tucker, H. S.
Weaver, T.
Whittles, H.
Williams, J.
Wood, E. B.
Wright, G.

Bishop Auckland.
Dobinson, T.
Harburn, R. H.
*Leigh, J. J.
Thorburn, H.

Bishop's Castle.
Owen, J.

Bishop Stortford.
Speechly, G.

Blackburn.
Bickerdike, W. E.
Booth, J.
*Farnworth, W.
Moulden, W.
Whewell, G.

Blackpool.
Harrison, J.
Jackson, J.

Blairgowrie.
Crarar, J.
Grant, W.

Bodmin.
Williams, J. D.

Bognor.
Long, A. T.

Bolton, Lancashire.
Blain, W.
Bowker, W.
Challinor, S. M.
Dutton, F.
Evans, D. O. (Farnworth.)
Harrison, R. (Farnworth.)
Hart, J.
Hart, W.
Holmes, T.
Holstead, T.
Martin, R.
Mason, W. B.
Morris, T. (Farnworth.)
Moscrop, T.
Pownall, T. R.
Watkinson, J. W. (Farnworth.)
Worfolk, F.
Young, J.

Borrowstowness, N.B.
Hughes, F. R.

Boston.
Fowler, W. R.
*Marshall, R.
Mells, H. (Kirton.)
Pilley, S.
Pitcher, W. J.

Boston Spa.
Gill, H.
Rogerson, M.

Bourne.
*Mills, R. M.

Bournemouth.
Trim, E.
Worth, E.

Brackley.
Sirett, H.

Bradford-on-Avon.
Saunders, T. P.

Bradford, Yorkshire.
Appleyard, R.
Bailey, J. T.
Beanland, S.
Bell, F.
Butterworth, A.
Cockshott, W.
Drake, W. (Wyke.)
Faull, J.
Handforth, E.
Harrison, T.
Henderson, C.
Hick, J.
Jackson, J.
King, W.
Lister, S.
Metcalfe, A. A.
Newsholme, W.
Parker, W.
*Parkinson, R.
Pullan, T.
Rimmington, F. M.
Savage, J. L.
Sharp, J.
Silson, R. W.
Stead, T.
Swaine, J.
Thornton, H.
Walker, J.
Watts, J.
West, W.
White, W.

Braintree.
Downing, J. G.

Bray.
Vance, J. N.
Vance, W. N.
Doran, A. E.

Brenchley, Kent.
Keene, J.

Brentwood, Essex.
Guest, E. P.

Bridge, Kent.
Thomas, J.

Bridge of Allan, N.B.
Farie, G.

Bridgewater.
Woodward, J. L.

Bridlington Quay.
Dickins, J.

Bridport.
Beach, J.
Tucker, C.

Brierley Hill.
Geary, E.

Brigg.
Nicholson, W. O.

Brighton.
Barton, H.
Billing, T.
Cornish, W.
Dinnis, J.
Edwards, J.
Else, W.
Ettles, J.
Foster, F.
Gibson, W. H.
Glaisyer, T.
Guy, F.
Gwatkin, J. T.
Haffenden, T.
Harris, E. R.
Histed, E.
Kent, G. F.
Long, H.
Padwick, J.
Robson, T.
*Savage, W. D.
Savage, W. W.
Smith, W. H.
Vizer, E. B.
Warneford, F.
Warren, G. R.
Watts, C. C.

Brill.
Holmes, F. G.

Bristol.
Ackerman, T.
Berry, W.
Boorne, C.
Bush, T. (Paulton.)
Cuff, R. C.
Dudden, R. M.
England, W.
Fardon, H.
Freestone, T. M.
Gare, J.
Hartland, J.
Hatch, R. M.
Jennings, T. H.
Lockyer, W. J.
Matthews, H.
Pitman, J.
Plumley, J. G.
Rich, T.
Samson, E.
Saunders, T. C
Sprackett, G.
*Stoddart, W. W.
Stoddart, W. W.
Stroud, J.
Thomas, J. D. D
Townsend, C.
Tucker, R. L. (Redland.)
Wright, C. W.

Briton Ferry.
Olive, W. T.

Bromsgrove.
Haines, J. J.
Taylor, W. G.

Bromwich, West.
*Burch, W.
Green, J.
Holliday, T.
Roberts, G.

Broseley.
Stevens, J.

Brynmawr.
Evans, A. E.
Jones, A. M.

Buckie.
Bremner, J.

Buckingham.
Kingerlee, G.

Burnham, Somerset.
Williams, G. L.

Burnley.
Ashworth, T.
Hay, D. (Nelson.)
Hitchin, R.
*Thomas, R.
Wilks, M.

Burslem.
*Blackshaw, T.
Guest, G. C.
Oldham, W.

Burton-on-Trent.
Brierley, J.
Wright, G.

Bury, Lancashire.
Pennington, T.

Bury St. Edmunds.
*Floyd, J.
Hardwicke, E. J.

Bushey Heath.
Short, F. C.

Buxton.
Ball, E.
Barnett, A.
Sykes, E. J.
Thresh, J. C.

Cambridge.
Church, H. J.
Crampton, J.
*Deck, A.
Muir, M. M. P.
Yeomans, J.

Cambusland.
Clark, S. P.

Campbeltown.
Barton, A.

Canterbury.
Amos, D.
Gardner, A. W.
*Harvey, S.

Cardiff.
Collier, J. A.
John, W. D.
Jones, J. T.
Joy, F. W.
Proctor, R. (Penarth.)
Reynolds, T. (Caerphilly.)
Williams, T.

Carlisle.
Fisher, J. J.
Foster, J.
Graham, J.
Hallaway, J.
Pattinson, J. S.
Richardson, T. J.
Robson, J.
*Thompson, A.
Todd, J.
Walker, J. D.

Carmarthen.
Jones, E. B.
Rees, D.

Carnoustie.
Nicol, W.

Carrickfergus.
Bowman, D.

Carshalton.
Thornley, C.

Castlebar.
Devers, H. J.

Cerrig-y-Druidion.
Williams, E.

Chapeltown.
Gibson, J.

Chard.
Churchouse, W. J. F.
Woodland, W. F.

Chatham.
Lamb, T. C.
Rossiter, J.

Chelmsford.
Baker, C. P.

Cheltenham.
Balcomb, J.
*Barron, W.
Beetham, M.
Fletcher, J.
Forth, W.
Horsley, J.
Jeffrey, T. A.
Kite, W. T.
Smith, N.
Toone, J. A.

Chertsey.
Boyce, G.

Chester.
Baxter, G.
Grindley, W.
Hodges, W.
Marcham, J.
Mills, J.
*Shepheard, T.

Chesterfield.
Greaves, A.
Wilson, R.

Chester-le-Street.
Greenwell, R. H.
Longbotham, J.
*Robinson, Joseph (Stanley.)

Chippenham.
Coles, J. C.

Chislehurst.
Beaumont, C. F. J. B.
Wing, L.

Chorley.
Bradshaw, J. (Adlington.)

Chudleigh.
Cleave, W.

Church Stretton, Salop.
Phillips, J.

Cirencester.
Church, A. H.
Smith, C. S.
Young, D.

Clayton-le-Moors.
Johnson, M.

Cleator Moor.
Turner, J. K.

Cleethorpes.
Peck, F. A.

Cleobury-Mortimer.
Evans, E. P.

Clifton, Bristol.
Barker, C. D.
Mortimer, J.
*Schacht, G. F.
Tilden, W. A.
Towerzey, A.
Tritton, C.
Troake, R. J.
Warner, G. T.
White, J. W.

Clones.
Murray, E. P.

Clonmel.
Reynolds, W. J.

Clontarf.
Robinson, J. O.

Clun, Salop.
Darroll, W.

Coalville.
Porter, J.

Cockermouth.
Robinson, W.

Codnor.
Farnsworth, T.

Colchester.
Cole, F. A.
Hammerton, E.
Shenstone, J. C.

Colinsburgh, N.B.
Todd, T.

Collumpton.
Foster, J.

Colne, Lancashire.
Asquith, W. C.

Connah's Quay.
Jones, K. L.

Consett.
Imrie, D.

Cork.
Bannister, W.
Beamish, G. P.
Cooke, J.
Goulding, W.
Harrington, W.
Jennings, F. M.
Lester, T. R.
Selkirk, J.
Spencer, W. A. C.
Sunner, R.
Whitford, J. G. P.

Cosham.
Baker, G.

Coventry.
Astley, J.
Barrett, F. J.
Glover, H.
Hands, R. M.
Hinds, J.
Hiscock, R.
Hodgkinson, G.
*Powers, E.
Tod, J.
Welton, H.
Wyley, J.
Wyley, W. F.

Cranbrook.
Smith, J. W.

Crawley.
Leach, J.

Crediton.
Jackson, W.

Crewe.
Gray, J. T.
Kay, J.

Crewkerne.
Greaves, J.
Harris, M. C. J.
Pearce, J.

Crieff.
Hurley, J.

Cromarty.
Johnstone, W.

Crook.
Wilkinson, W.

Crowle.
Pickering, J.

Croydon.
Clarke, A. H.
Long, H.
Stannard, F. J.

Cullen.
Kemp, J.

Cupar, Fife.
Caw, J.

Dalkey.
Beggs, G. D.

Darlington.
Robinson, A. F.
Robinson, J.
*Swenden, J.

Dartford.
Armitage, E. H.
Horrell, A. E.

Dartmouth.
Rees, W. H.

Darwen, Lancs.
Shorrock, R.

Dawlish.
Cutcliffe, G. J.
West, E. R.

Deal.
Clarabut, J. B.
McDiarmid, J. B.

Denny.
Anderson, E. H.

Derby.
Barnes, B.
Clifton, F.
*Frost, G.
Grindley, G. H.
Marshall, W.
Monkhouse, H.
Stevenson, R.
Wilson, J.

Devizes.
Stewart, E. H.

Devonport.
Breeze, G.
*Codd, F.

Dewsbury.
Foster, A.
Fox, G.

Diss.
Amyot, T. E.
Cupiss, F.
*Gostling, T. P.
Gostling, W. A.
Hayhoe, W.
Nicholson, D. G.
Thrower, E. A.
Whitrod, H. F.

Dolgelly.
Roberts, J. C.

Doncaster.
Hasselby, T. J.
*Howorth, J.
Shaw, H. W.
Stiles, M. H.

Dorchester.
Durden, H.
How, W.

Dorking.
Clift, J.

Dover.
Adams, R. W.
*Bottle, A.
Brown, J. F.
Cotterell, W. H.
Forster, R. H.
Hambrook, J. B.
Peake, H.

Downpatrick.
Morrow, B.

Driffield.
Bordass, J.
Parkinson, T.
Ross, L. B.
Sterriker, J.

Droitwich.
Taylor, E.

Drybrook.
Linford, J. S.

Dublin.
Allen, C. A.
Allen, W.
Boyd, S.
Brunker, J. E.
Draper, H. N.
Evans, J.
Froedman, F.
Galwey, R. J.
Goodwin, J.
Griffin, C. H.
Hamilton, J. T.
Hartford, J.
Hartt, C.
*Hayes, W.
Holmes, J. T.
Murphy, W. C.
Nugent, —
Park, W. S.
Purefoy, R. D.
Queale, J. W.
Quinlan, F. J. B.
Reynor, A.
Scott, W.
Simpson, R.
Stoney, J. D.
Thompson, S. M.
Tichborne, C. R. C.
Wells, W. F.

Dudley.
Dawson, J.
*Dennison, M.
Fletcher, J.
Hollier, E.
Thompson, J. W. (Sedgley.)
Voce, W. G. (Netherton.)

Duffield.
Cutting, J.
Scriven, J. S.

Dufftown.
Proctor, A. D.

Dumbarton.
Babtie, J.
Binnie, R.

Dumfries.
Fingland, J. (Thornhill.)

Dundee.
Anderson, A. B.
Esplin, A.
Hardie, J.
*Hodge, J.
Kerr, C.
Miller, T. S.
Park, W.
Parker, F. C.
Russell, J.
Young, C.

Dunfermline.
Seath, A.
Stiell, G.

Dunkeld.
McDonald, K.

Dunse, N.B.
Gunn, W.

Durham.
*Burdon, J.
Hunter, F. N.
Lambert, J.
Leighton, J. H.
Sarsfield, W.

Earlestown.
Peake, A.

Easingwold.
Rookledge, J.

Eastbourne.
Hall, S.

East Dereham.
Abram, F. W.
Strangroom, F. (Cley.)

East Grinstead.
Tully, J., senr.

East Retford.
Appleby, C.
Fletcher, F. P.
Welbury, G.

Eastwood.
Ault, J.
Chambers, J.

Eccles.
Howie, W. L.

Edinburgh.
Ainslie, W.
Aitken, J.
Aitken, R.
Anderson, W.
Archer, T. C.
Baildon, H. B.
Baildon, H. C.
Blanshard, G.
Brown, D.
Buchanan, J.
Dott, D. B.
Ewing, J. L.
Fairgrieve, T.
Gilmour, W.
Guthrie, A. D.

Laird, G. H.
Macadam, S.
Macadam, W. I.
McCowan, W.
Macdonald, J.
Macfarlane, A. Y.
McGlashan, D.
Mackay, G. D.
Mackay, J.
Mackenzie, J.
Maclagan, D.
Midgeley, J. H.
Moinet, F. W.
Morrison, D.
Napier, A.
Niven, W. R.
Noble, A.
Pinkerton, W.
Purves, S.
Raimes, R.
Robertson, J.
Smiles, J.
Smith, P. S.
Smith, T.
Stephenson, F.
Symington, T.
Taylor, A.
Whyte, J. S.
Young, J. R.

Ely.
Lincolne, N.

Emsworth.
Waters, H. G.

Ennis.
Seymour, T. T.

Enniscorthy.
Cooke, P. M.

Esher.
Ling, E.

Evesham.
Willis, B. W.

Exeter.
Collett, C. B.
Cooper, G.
Delves, G.
Gadd, H.
Hunt, A.
Husband, J. C.
Napier, G. L.
Pasmore, G.
Shenstone, W. A.
Stone, F. W.

Exmouth.
Teed, D.
Thornton, S.

Eyam.
Froggatt, T. W.

Falkirk.
Murdoch, D.

Falmouth
Newman, W. F.

Fareham.
Batchelor, C.
Franklin, A.

Farnham.
Higgins, W.

Faversham.
Lenfestey, W. G.

Ferryhill.
Smith, R.

Fethard.
Burgees, F. C.

Flint.
Jones, M.

Folkestone.
Goodliffe, G.
Lea, J.
Stainer, J.

Forebridge, Stafford.
Spilsbury, J.

Forfar.
Anderson, D. S.

Formby, Lancs.
Blood, C.

Forres.
Michie, J.

Foulsham, Norfolk.
Newport, W.

Frizington.
Allatt, F. T.

Frodsham.
Robinson, J. F.

Gainsborough.
Howlett, W. H.

Garstans.
Thomas, J. J.

Gateshead.
Brady, H. B.
Elliott, R.

Glasgow.
Adam, T.
Black, J.
Brodie, R.
Buchanan, T. D.
Campbell, J.
Clarke, J. A.
Cowan, —
Currie, J.
Davison, T.
De Nance, W. C.
Dickie, J.
Fairlie, J. E.
Fairlie, J. M.
Fenwick, J.
Forrest, R. W.
Frazer, D.
Greig, W.
Guthrie, P.
Halley, A.
Harrower, P.
Hume, R.
Hunter, J. C.
Jaap, J.
Kennedy, W.
*Kinninmont, A.
Lindsay, T.
Lockhart, J.
McAdam, R.
Machattie, A. T.
McKenzie, W.
McLeod, T.
M'Millan, J.
Muir, G.
Murdoch, G.
Murdock, J.
Nairne, J. S.
Nicol, J.
Paris, W.
Paterson, A.
Paton, —
Pinkerton, J. S.
Rait, R. C.
Remmers, B. H.
Rose, A.
Schmidt, A.
Semple, J.
Stanford, E. C. C.
Tennent, G. P.
Twaddle, R.
Walker, T.
Wallace, W.
White, J.
Whyte, W.
Wyllie, A.

Gloucester.
Berry, E.
Cook, T.
Hume, J. W. D.
Meadows, H.
Stafford, W.
Ward, J.

Goole.
Roulston, B. W.

Govanhill.
Steele, J. C.

Gorleston, Gt. Yarmouth.
Thurlby, G.

Gosforth.
Gaitskill, J.

Gosport.
Mumby, C.

Gourock.
Barr, R.
Peters, J.

Grantham.
Cooper, H. G.
Fisher, F. D.
Hall, T.
*Hopkinson, T.
Newcome, J.
Welborn, G.
Whysall, W.

Great Bedwin.
Gerard, G. R.

Great Yarmouth.
Gardner, J. R.
Lee, J.
Skoulding, G. S. F.
Walpole, W.
Wright, J.

Greenock.
Armitage, G.
Baine, J. A.
Duncan, S.
Fisher, T.
M'Naught, A.
Stewart, A. D.
Stewart, G. C.
Wilson, G.

Grimsby.
Bottrill, G. T.
Cook, R.
Gossop, G. K.

Guernsey.
Anderson, H. D.
Arnold, A.

Guildford.
Jeffries, H.
Vennall, G. (Cranleigh.)

Guisborough.
Bancks, A.

Guiseley.
Archer, J. S.

Hadfield.
Jones, J.

Halifax.
Dyer, W.
Farr, J.
*Hebden, W. C.
Pedley, T. (Triangle.)

Hamilton.
Mackill, R. C.
Stewart, J

Hanley, Stafford.
*Jones, C.
Lloyd, J.
Tirrell, J.
Wilson, W.

Harleston.
Borrett, H.
Muskett, J.

Harpenden.
Busby, J.

Harrogate.
Allanson, C.
*Coupland, J.
Davis, R. H.
Taylor, J. H.
Wilson, J. H.

Hartlepool.
Warwick, D. H.

Harwich.
Bevan, C. F.
Harding, J.

Hastings and St. Leonards-on-Sea.
Keyworth, G. A.
*Robinson, J. S.
Rossiter, F.

Havant.
Chignell, A.

Haverfordwest.
Saunders, D. P.

Hay.
Davies, J. L.

Hayle.
Williams, W. H.

Hebden Bridge.
Hey, D.

Heckmondwike.
Booth, J.
Stephenson, J. N.

Helenburgh.
Harvie, G.

Helmsdale.
Paterson, J.

Helmsley.
Read, W.

Helston.
Troake, M. H.
Wakeham, C.

Hertford.
Durrant, G. R.

Hexham.
Riddle, W. R.
Turner, J.

Heywood.
Jackson, J.

Higher Tranmere.
Walkden, J.

Hinckley.
Gilbert, G.
Pridmore, W.

Hindley.
Slingsby, C. S.

Hirwain.
George, J. E.
Sims, J.

Hitchin.
Ransom, W.

Holsworthy.
Oliver, J. S.

Holyrood.
Macaulay, J. J.

Honiton.
Lee, W.
Turner, G.

Horncastle.
Carlton, W. P

Houghton-le-Spring.
Rowell, R. H.

Huddersfield.
Cuthbert, R.
Jarmain, G.
Kaye, H.
King, W.
Rhodes, G. W.
Swift, T. N.

Hull.
Allison, E.
Anholm, A.
Baynes, J.
Baynes, J.
*Bell, C. B.
Benson, J. L.
Clarke, I.
Dixon, H.
Dixon, J.
Earle, F.
Hall, H. R. F.
Hammond, C. T.
Lowther, M. K.
Metcalfe, C. L.
Milner, J. G.
Myers, G.
Pickering, A.
Soutter, J. S.
Staning, W.
Stoakes, B. M.

Hungerford, Berks.
Taylor, W. G.

Hyde, Cheshire.
Curfew, J.
McClean, J.
Wild, J.

Hythe.
Lemmon, R.

Idle, Yorks.
Hopton, E.

Ilchester.
Barrett, T. G.

Ilford.
Beal, E. J.

Ilkeston.
Merry, W.
Potts, R. S.

Insch, N.B.
Craig, G.

Invergordon.
Sinclair, R.

Inverness.
Fraser, J.

Ipswich.
Callaway, L.
Cornell, W.
Grimwade, E.
Sayer, E. C.
*Wiggin, J.

Ironville.
Greaves, W. S.

Irvine.
Gillespie, J.

Isleham.
Diver, B.

Isle of Man.
Brearey, W. A. (Douglas.)

Ixworth.
Thurlow, H.

Jarrow-on-Tyne.
Rose, J. D.
Watson, R. T.

Jedburgh.
Peters, J. F.

Jersey.
Ereaut, G.

Keelby, near Ulceby.
Skinner, M. H.

Kelso.
Dodds, G. F.

Kendal.
Bateson, T.
Coulter, G. (Sedbergh.)
Hind, T. W. L.
Kirkby, R.
*Severs, J.

Kenilworth.
Barton, H. E.

Keswick.
Henderson, M. J.

Kettering.
Hitchman, H.

Kidsgrove.
Griffiths, E. H.

Kidwelly.
Glencross, W.

Kilkenny.
Sterling, W.
Walters, J.

Kilmarnock.
Borland, J.

Kingsbridge, Devon.
Troake, W. H.

King's Lynn, *see* Lynn.

Kingston-on-Thames.
Brewster, W.
Tamplin, E. C.

Kingstown.
Bennett, H.

Kingswinford.
Steward, J.

Kington, Hereford.
Stanway, W. H.

Kirkby Stephen.
Armstrong, J.

Kirkcaldy.
Coutts, A. (Pathhead.)
Gorrie, A.
Macknight, S. W.
Storrar, D.

Kirkintilloch.
Morton, T.

Kirriemuir.
Ford, J.

Knaresboro.
Sindall, J. W.
Thompson, J.

Lanark, N. B.
Cassels, T.

Lancaster.
*Bagnall, W. H.
Battersby, S.
Cardwell, E.
Clark, E.
Hall, W.
Vince, J.

Landport.
Ball, W.
Hackman, L. L.
Stanswood, J.

Langharne.
David, S. S.

Launceston.
Eyre, J. S.

Leamington.
Barnitt, J.
Bollans, E.
Davis, H.
*Jones, S. U.
Pullin, W. H.
Smith, S. A.
Spilsbury, J.
Woolcott, C.
Wright, W. F.

Lechlade, Gloucestershire.
Archer, J.
Kinch, C. J.

Ledbury, Hereford.
Freeman, E.

Leeds.
Abbott, J.
Barraclough, T.
Brooke, T.
Broughton, A.
Brown, E.
Clapham, J.
Clapham, J. W.
Clark, W. T.
Day, J.
Dunn, H.
Ebdell, J. T.
Exley, G.
Fawthorp, J.
Ferguson, W. K.
Greasley, M. F.
Hardman, J. W.
Hill, F.
Holmes, J.
Horsfield, J. N.
Iredale, G.
Iredale, T.
Jackson, W.
Jefferson, P.
Longley, J. W.
Manfield, W.
Patchett, I.
Pocklington, H.
Powell, W.
Reynolds, F.
*Reynolds, R.
Rhodes, W. H.
Saxton, J.
Smeeton, W.
Stead, T. B.
Steele, E. B.
Tate, J. L.
Taylor, S.
Ward, G.
Watson, J.
Wildsmith, E.
Wood, W. A. (Hunslet.)
Yewdall, E.

Leek, Staffordshire.
Johnson, W.

Leicester.
Burrows, H. C.
Butler, E. H.
Carr, W.
Clark, J. W.
Cooper, T.
Harvey, W. R.
Lloyd, T. H.
Meadows, J.
*Richardson, J. G. F.
Salisbury, W. B.
Slater, J.
Toone, J. H.
Wand, S.
Wilkes, J. S.
Woodcock, J.
Young, J.

Leigh.
Whittle, S.

Leighton Buzzard.
Herington, J.
Richmond, R.

Leith.
Finlayson, T.
Meldrum, E. D.

Leominster.
Davis, D. F.

Lessness Heath, Kent.
Heaton, C. W.

Leven.
Gibson, A.

Levenshulme.
Botham, G.
Hall, J. T.

Lewes.
Curtis, H.
Saxby, H., junr.

Leyburn.
Campbell, G.

Limerick.
Hance, T. S.
Laird, J.

Lincoln.
*Hayward, C. J.

Lisnaskea.
Thompson, L.

Little Bolton.
See Bolton.

Liverpool.
*Abraham, J.
Abraham, T. F.
Alexander, J.
Ball, G.
Barber, G.
Barton, A. F. G.
Bathgate, W. L.
Billington, F.
Blabey, J. J. (Woolton.)
Blain, A. H.
Buck, J. M.
Buck, R. C.
Chellew, W. D.
Cohen, N. S.
Cook, E. A.
Dale, J.
Davies, E.
Driver, T. (Woolton.)
Evans, E.
Evans, E., junr.
Evans, J. J.
Evans, J. R.
Evans, R.

Ferguson, J.
Flint, J.
Fraser, A.
Furniss, T.
Greenall, A.
Hall, T.
Hallawell, J.
Hocken, J.
Humphries, E.
Hunt, T.
Johnson, J. H.
Johnson, M. (Hu[illegible]-
ton.)
Jones, F.
Lee, S. W.
Lewis, R.
Lloyd, J. W.
Lumby, A.
Marson, B. B.
Martin, J.
Martin, T.
Mason, A. H.
McVitie, T.
Monkhouse, J.
Parkinson, R.
Robinson, J. F.
Samuel, A. H.
Sergeant, T. W.
Shaw, J.
Sumner, R.
Symes, C.
Tanner, A. E.
Taylor, C.
Troughton, C.
Williams, W.
Worthington, J. V.
Woodhead, J. T.
Wright, W. O.
Wyatt, H.

Llandudno.
Penney, W. S.

Llanegryn.
Pugh, H.

Llanelly.
Broom, G.
Hughes, E.

Llangefni.
Hughes, R.

Llangollen.
Jones, H.

Llanwrst.
Jones, J.

Loddon.
Ellis, T. W.

London, E.
Allen, W. H.
Arnold, G. J.
Bailey, J. H.
Bishop, A.
Bishop, W. B.
Burton, J. D.
Clark, J. A.
Dixon, J. B.
Eastman, J. E.
Edwards, E.
Fitzgerald, A. B.
Fox, W.
Fox, W. A.
Frost, W. T.
Glassford, J. McL.
Goodwin, J.
Granger, E. J.
Hatfield, G. B.
Hills, H. W.
Holford, T. C.
Howard, D.
Howard, W. D.
Kernot, G. C.
Kirk, S.
Nicholls, T.
Owen, R. J.
Rayson, H.
Ringrose, G.
Rogers, W.
Sharman, W.
Skipper, E.
Street, G.
Telfer, H. V.
Thorp, W., junr.
Tyrer, P.
Walker, C.
Wilkinson, B. J.
Wootton, A. C.

London, E.C.
Armstrong, H. E.
Attwood, A.
Barron, F.
Best, T. F.
Brown, H.
Charity, W.
Cocksedge, H. B.
Colclough, W.
Constance, E.
Crawshaw, E.
Crispe, J.
Darby, S.
Evans, H. S.
Faries, T.
Fentiman, A.
Flux, W.
Foster, M. E.
Francis, G. B.
Francis, G. B., junr.
Francis, R. P.
Francis, W. H.
Froom, W. H.
Gadd, H.
Gedge, W. S.
Gething, W. B.
Grimwade, E. W.
Hampson, R.
Hanbury, C.
Hanbury, F. J.
Harvey, E.
Hawkins, T.
Heathfield, W. E.
Herring, H.
Hewlett, C. J.
Hill, A. B.
Hindsley, H.
Hodgkinson, C.
Hodgkinson, W.
Hooper, B.
Hopkin, W. K.
Horner, E.
Horner, E., junr.
Howden, R.
Hughes, L. S.
Hugill, J.
Huskisson, H. O.
Jones, J. H.
Knight, J.
Langdale, E. F.
Leath, J.
Lescher, F. H.
Lowe, A. J. G.
Mackey, J. B.
Marston, J. T.
Matthias, J. J.
Maw, C.
Medcalfe, B. P.
Pasmore, F. R.
Pattison, G.
Pedler, G. S.
Penrose, A. P.
Pond, G. P.
Preston, J. C.
Robertson, F. F. L.
Rossiter, W.
Schacht, W.
Selleck, E.
Simmonds, P. L.
Squire, A.
Squire, W.
Stewart, A. Y.
Thompson, H. A.
Thompson, J.
Tidman, W.
Ward, J. S.
Warner, C. H.
Watson, T. D.

Watts, W. M.
Williams, J.
Williams, W. J.
Wink, J. A.
Wyman, J.

London, N.
Applegate, E.
Arundel, M. H.
Ball, G.
Bradley, F.
Broad, J.
Broad, J. M.
Clapp, E. F.
Colchester, W. M.
Coles, F.
D'Aubney, T.
Dutchman, W.
Farrow, C. H.
Garner, T.
Handley, C.
Harris, W. W.
Hodsoll, T. W. H.
Jefferson, T.
Jones, T. P.
Large, J. H.
Little, H.
Lorimer, J.
Marshall, A.
Mason, H. C.
Morris, G. E.
New, W. W.
Owen, J.
Parkes, J. P.
Reboul, A. P.
Skipper, E.
Steel, F. W.
Stenhouse, J.
Stevens, P. A.
Strawson, G. F.
Tipping, T. J. W.
Trick, W. B.
Warrell, E.
Whincup, W.
Young, R. F.

London, N.W.
Allchin, A.
Baily, J.
Barret, E. L.
Bell, W. H.
Betty, S. C.
Biddiscombe, C.
Bindloss, G. F.
Cottrill, J. W.
Dunmore, G. H.
Glazier, W. H.
Goldfinch, G.
Greenish, T.
Greenish, T. E.
Hall, T. H.
Henty, H. M.
Johnson, J.
Laws, J.
Merrell, J.
Nash, H.
Pettinger, E.
Rhind, W. W.
Sangster, A.
Souter, J. C.
Stamp, E. B.
Stansfield, R.
Stenson, J.
Symons, W. H.
Taplin, W. G.
Taylor, G. S.
Tibbs, F.
Tuson, R. V.
While, W. J.
Wills, J. L.
Woodland, J.

London, S.E.
Atkinson, L.
Austin, H. F.
Balchin, E. S.
Baldock, J. H.
Balls, G.
Bateman, T. H.
Bernays, A. J.
Biddiscombe, C.
Birch, H. C.
Bishop, W. M.
Braby, F.
Brown, A. J.
Bullock, F.
Busby, H. H.
Cardwell, E.
Churchill, H.
Clarke, W. L.
Clift, E.
Cole, A. C.
Collier, H.
Congreve, G. T.
Courtenay, A.
Crisp, F. A.
Crow, E. L.
Dodd, W.
Dodwell, J.
Earland, W.
Elliott, J. D.
Gadd, R.
Green, S.
Grisbrook, S.
Hadingham, J. W.
Hall, T.
Hall, W.
Howell, M.
Izod, J.
Jones, T.
Lockyer, G.
Miller, C. B.
Orpe, T. M.
Page, J.
Plowman, S.
Poingdestre, C. R.
Rabson, H.
Ridd, A. H.
Sandy, F. W.
Sargent, D. W.
Silverlock, H. T.
Silvers, F. T.
Simpson, T.
Smith, J. B.
Smith, T. S. T. W.
Smith, W. F.
Stable, R. H.
Strickett, J.
Strongitharm, W. G.
Taylor, T.
Thompson, H.
Tibbs, F.
Troke, C.
Truman, H. V.
Umney, C.
Wade, W.
Wastie, F. W.
Watling, A.
Wiggins, H.
Wilkinson, W.
Wills, G. S. V.
Wiltshire, T. P.
Wright, G. H.
Yates, F.

London, S.W.
Amoore, A. S.
Ashton, W.
Barnes, J. B.
Bicknell, W.
Biffin, T.
Bourdas, I.
Bourdas, I., junr.
Brewster, W.
Brooks, C.
Browne, G.
Burt, G. E.
Churchill, H.
Colomell, D. B.
Cooke, P.
Cooper, A.
Cromwell, O.
Curtis, T.
Deane, J.
Deering, A.
Drane, W.
Dyer, A. J.
Evans, E.
Fenn, J. W. T.
Field, A. W.

Frankland, E.
Gulliver, W.
Hake, H. W.
Hall, F.
Hanbury, D. B.
Heath, E. A.
Helmore, W. H.
Hickey, E. L.
Hilder, R. T.
Holmes, W. M.
Hucklebridge, J. M.
Hunt, C.
Ingham, J.
Ive, W.
Jones, H. S.
Lake, R.
Luff, R.
May, J.
Newby, R. J.
Palmer, P. L.
Pond, B. C.
Roach, P.
Robinson, R. A.
Rowe, R.
Schweitzer, J.
Simpson, J.
Smith, J. S.
Spyer, N.
Staples, C.
Stevenson, T.
Sutcliffe, J.
Tippett, B. M.
Tupholme, E. H.
Tupholme, J. T.
Turton, R. C.
Tyrer, T.
Urwick, W. W.
Walker, B. W.
Wheeler, J. W.
Williams, E.
Williams, R.
Wills, J. L.
Woodcock, R. C.

London, W.

Adlington, W. B
Andrews, F.
Backhouse, H. N.
Barker, W. R.
Barnard, J.
Bascombe, F.
Bathe, R. S.
Bird, A.
Bird, W. L.
Blades, F.
Bowles, W. J.
Branson, F. W.
Brightmore, W.
Bullock, J. L.
Burden, E. M.
Butt, E. N.
Carteighe, M.
Cawdell, G.
Clark, A. H.
Cleaver, E. L.
Clifford, T. A.
Cook, R.
Cosway, E. C.
Coverley, E. C.
Cracknell, C.
Croyden, C.
Cryer, H.
Cullen, R. H.
Davies, R. H.
Duncalf, J. M.
Dyson, W. B.
Faulkner, J. R.
Fincham, R.
Foster, W.
Fowler, S.
Gardner, J.
Gale, S.
Garner, J.
Gaubert, S.
Gutheridge, G. F.
Hamilton, J.
Hardy, S. C.
Hayles, B. H.
Haynes, C. H.
Heald, S.
Hemingway, A.
Hemingway, E.
Hemingway, W.
Heywood, J. S. C.
Hickman, W.
Hills, T. H.
Hills, W.
Hogg, R.
Horncastle, J.
Horsley, T. W.
Humpage, B.
Humphries, E.
Hyne, H.
Ince, J.
Jackson, C.
James, I. R.
James, J. T.
Jewell, R. J.
Jones, W. C.
Keene, E.
Kingsford, F.
Kingzett, C. T.
Lewinton, A. B.
Lingwood, W.
Long, H.
Luff, A. P.
Martindale, W.
Mason, R. W.
Mathews, J. H.
Matthews, W.
Maudsley, W.
Mellin, G.
Millington, W. S.
Mitchell, M. F.
Moyle, J.
Nowell, B.
Nutt, A. J.
Pickard, W.
Postans, A. W.
Prichard, E.
Probyn, C.
Reichardt, E.
Reynolds, J. J.
Richardson, B. W.
Richardson, G.
Robbins, J.
Sandford, G. W.
Sanger, W. A.
Savory, A. L.
Savory, J. F.
Sharpe, G. Y.
Shaw, J. W.
Shephard, T. F.
Shirtliff, W.
Smith, F. C.
Smith, J. T.
Smith, W.
Squire, A. H.
Squire, P.
Squire, P. W.
Squire, W.
Stevenson, W. L.
Storey, E. H.
Stuart, J. E.
Taylor, J.
Thorn, J. J.
Tily, C. A.
Titley, T.
Trotman, A. C.
Tucker, R. L.
Verity, R.
Voelcker, A.
Watts, J.
Watts, W.
Waugh, H.
Webb, E. A.
Wells, T.
Weston, S. J.
Westrup, J.
Wilkinson, T.
Williams, J. J.
Williams, W. H.
Wooster, J. R.
Wright, C. R. A.
Wyles, W.
Young, W.

London, W.C.
Akhurst, W. E.
Attfield, J.
Bannister, R.
Bentley, R.
Bletsoe, J.
Buckle, C. F.
Burroughs, S. M.
Challice, W. G. W.
Cooper, H.
Davenport, H.
Davenport, J. T.
Gerrard, A. W.
Holmes, E. M.
Huggins, R.
Huskisson, H. O.
Lamplough, H.
Law, A.
Mackey, J. B.
McCulloch, F.
Morson, T.
Moss, J.
Passmore, F.
Pedler, A.
Pugh, G.
Redwood, T.
Rich, S. W.
Sainsbury, S.
Senier, A.
Stacey, G. H.
Stacey, S. Ll.
Starkie, R. S.
Stevens, F.
Stoker, G. N.
Taubman, R.
Taylor, C. W.
Thomas, H.
Turner, C. E.
Willmott, W.
Wright, A.

Londonderry.
Byrne, S. J.
Taaffe, H.

Longford.
MacManus, J. H.

Long Sutton.
Sutterby, J. N.

Longton.
Prince, A. G.

Louth.
Greenwood, J. T.
*Hurst, J. B.
Simpson, H. D.

Lower Broughton.
Clarke, J. T.

Lowestoft.
Farrett, W. B
Good, T.
Pearse, W. F.
Rayson, A. J.
Wright, A.

Ludlow.
Nickson, J.

Luton.
Wootton, P.

Lydd.
Nowers, E. A.

Lymm, Cheshire.
Evans, I. H.

Lynn, Norfolk.
*Atmore, G.
Cocher, J. A.

Lytham.
Crozier, R.
Fletcher, T.

Macclesfield.
*Bates, W. J.
Hodkinson, J.
Wood, R.

Macduff.
Cruickshank, J.

Machynlleth.
Thomas, J.

Maidenhead.
Thompson, C. H.
Walton, R.

Malvern Wells.
Johnson, T. S.
Morgan, W. J.
Wakefield, C. H.

Manchester.
Benger, F. B.
Blyton, J.
Boor, F.
Booth, W. G.
Botham, J.
Bowden, W.
(Patricroft.)
Brown, J.
Brown, W. S.
Bury, J.
Bushby, T.
Carter, W.
Cooper, F. R.
Dale, J.
Darling, W. H.
Davies, T.
Edwards, G.
Estcourt, C.
Gee, S.
Gibbons, T. G.
Gibson, J.
Gill, J.
Gill, J. W.
Hall, S.
Hardeman, J.
Hart, J.
Hart, T.
Hilditch, T.
Hinchliffe, F. G. U.
Horne, G.
Hughes, E. G.
Hunt, L.
Jackson, A. H.
Jackson, G.
Jones, J.
Kent, G. F.
Ker, A.
Kerfoot, T.
Lane, W.
Mather, W.
Maunder, R.
Midgeley, C.
Mitchell, J.
Mumbray, H. G.
Newton, J. A. C.
Paine, S.
Palmer, A. N.
Payne, J. B.
Peatson, H. R.
Pidd, A. J.
Pratt, G. W.
Pritchard, J.
Ramsbottom, G.
Robinson, B.
Savage, J. W.
Schorlemmer, C.
Siebold, L.
Standring, J.
Sugden, S.
Swinn, C.
Terry, T.
Thomson, W.
Twemlow, R.
Walker, S. J.
Wallwork, J.
(Tildesley.)
Wealthall, A.
West, T.
Wheeldon, J.
Wild, F.
Wilkinson, G.
Wilkinson, W.
Wilson, H.
Woodhead, W. H.
Woolley, G. S.
Woolley, H.
Wylde, —

Mansfield.
*Agar, W.
Oldham, J.
Patterson, D. J.

Marlborough.
Rowe, P. M.

Marlow.
Seaman, J. S.

Marshfield.
Garland, J. F.

Maryport.
Cockton, J.
Dixon, J.

Matlock Bridge.
Hodgkinson, J. S.

Mayfield.
White, E. A.

Melbourne, Derby.
Earp, J.

Melton-Mowbray.
Wing, G. N.

Merthyr.
Daniel, W. L.
Lewellyn, R.
Lewis, J.
Thomas, R.
While, W. J.

Mevagissey.
K

Middleton.
Roberts, J.

Mildenhall.
Chifney, G. J.

Milnthorpe.
Fothergill, S.

Minchinhampton.
Simpkins, J.

Mirfield, Yorks.
Crook, C.

Modbury.
Lakeman, N.

Mold.
Barker, R.
Williams, E.

Monaghan.
Henry, T.
Whitla, J.

Montrose.
Burrell, G.

Morecambe.
Birkett, J.
Gardner, T.

Mount Sorrel.
Tibbles, W.

Mountain Ash.
White, G. H.

Neath.
Hutchins, C.

Needham Market, Suffolk.
Harrington, A.

Newark-on-Trent.
Bullen, T.

New Barnet.
Field, J. J.

New Beckenham.
Bell, F. R.

New Brentford.
Wood, A.

Newcastle-on-Tyne.
Bellerby, M.
Bolam J.
*Brady, A.
Brockett, R. H.
Coates, J. M.
Crozier, W.
Dobson, J.
Dunn, J.
Frank, J. M.
Harcus, J.
Hume, A.
Ismay, J.
Ismay, J. G.
Jobson, R.
Kirkup, T.
Marreco, A. F
Martin, N. H.
Mayfield, J. S.
Owen, W.
Pattinson, J.
Potts, T.
Proctor, B. S.
Swan, J. W.
Todd, H. T.
Watson, M.
Webster, E. P.
Welch, T.

Newcastle-under-Lyne.
Cartwright, W.
Gould, J.
Poole, J.

Newmarket.
Rogers, A. R.

Newport, I. W.
Millidge, W. H.

Newport, Mon.
Faulkner, H.
Paine, C.
Young, J.

Newport Pagnell.
Taylor, T.

Newport, Salop.
Picken, T. W.

Newry.
Connor, S.
Hamilton, W. R.

Newton Abbot.
Godfrey, F.
Ponsford, J.
Savage, J. W.

Newtown, Montgomeryshire.
Lambert, W. H.

Newton Stewart.
MacCreath, J.

Northallerton.
Fairburn, J.
Warrior, H.

Northampton.
*Bingley, J.
Dadford, T.
Druce, G. C.
Griffin, T.
Harris, J.
Mayger, W. D.
Mayger, W. J.
Shipman, J. J.

Northwich.
Clough, J.
Lee, W.

Norwich.
Baker, P. C.
Caley, A. J.
Cooke, W.

Corder, O.
Cossey, J.
Eldridge, J. H.
Fitch, R.
Fuller, T. B.
Hayhoe, W.
Hill, A.
Nuthall, E.
Robinson, J.
Smith, R. B.
*Sutton, F.
Tice, R.
Watson, J. E. H.

Nottingham.
*Atherton, J. H.
Blankley, W.
Bolton, C. A.
Dadley, E.
Dennis, J. L.
Fitzhugh, R.
Guest, W.
Jackson, R.
Jenkins, J. T.
Manfull, H. J.
Oakland, C.
Oakland, W.
Parker, W. H.
Parr, S.
Rayner, J.
Smith, W.
Warriner, C. W.
Waterall, G. E.
White, F.
Wilford, J.

Nuneaton.
Iliffe, T. P.

Oakham.
Plant, W. E.

Oldcastle.
Gaynor, P.

Oldham.
*Bagshaw, W.
Berry, T.
Braddock, H.
Firth, W.
Hargraves, H. L.
Hurst, J.
Jackson, J. T.
Jackson, R.
Parkinson, W.
Shepherd, J.

Oldmeldrum, N. B.
Daniel, A.

Ossett.
Moore, R.

Otley.
Pratt, R. M.

Oundle.
Roper, H. E.
Turner, R.

Over Darwen.
Cronshaw, C.

Oxford.
Duck, W. B.
Hitchcock, C. E.
Houghton, T.
Odling, W.
Prior, G. T.
Squire, J.
Thurland, H.

Padiham.
Midgley, F.

Paignton.
Merson, W.

Paisley.
Cullen, T.
McMurray, J.

Patricroft.
Bowden, W.

Peebles.
Morison, G.

Pembroke.
John, D. W.

Pembroke Dock.
Bowling, J.

Penrith.
*Kirkbride, W.
Redfern, T.
Wilson, J.

Pentraeth.
Elias, J. R.

Penzance.
Cornish, H. R.

Perth.
Donald, D.
Gowans, J.

Peterboro.
Bright, R.
Read, H. H.

Petersfield.
Edgeler, W. B.

Plymouth.
Balkwill, A. P.
Bond, J. K.
Burdwood, J.
Clark, R. J.
Coker, O. C.
Eliott, S., junr.
Foster, F. H.
Furneaux, W. H.
Hearder, H. P.
Lewin, A. C.
Luke, R. S.
Moore, W. V.
Reade, O. A.
Turney, S. B.

Pontardulais.
Hinds, H. D.

Portarlington.
Staunton, G. H.

Pontypridd.
Bassitt, C.

Poole.
Atkins, T. W.
Penney, W.

Portaferry.
Filson, A.

Portobello.
Fitzgerald, A. H.
Kemp, D.
Nesbit, J.

Portree (I. of Skye).
Mitchell, A.

Portsea.
Spear, G.

Portsmouth.
Howlett, H. T.

Port Talbot.
Evans, E.
(Aberavon.)

Prescott.
Slack, J. K.

Presteigne.
Hughes, W., junr.

Preston.
Brown, W. B.
Frill, W. E.
Gosing, R.

Hargreaves, M.
Hillidge, G.
Mercer, J.
Smith, W.
Tomlinson, J.
Willan, W.
Worthington, W.
Wright, J. A.

Prestonkirk.
Trotter, J.

Prestwich.
Johnson, F.
Mercer, A.

Queen's Ferry, Flintshire.
Turner, J.

Queenstown.
Houghton, R. W.

Ramsbottom.
Morton, J.

Ramsey.
Palmer, F. W.

Ramsgate.
Balch, E.
Daniel, S.
Fisher, C.
Fisher, H. A.
Franks, A.
Gadd, W. F.
Hicks, R.

Raunds.
Swift, W. P.

Rawtenstall, Lancs.
Lord, L.

Reading.
Bailey, J. B.
Bartle, W.
Dowling, R.
Hill, J.
Welch, C.
While, W. J.
Wilson, J. P.

Redcar.
Dowson, J.

Redhill.
Padwick, T.
Sillitoe, F. H.

Redruth.
Edwards, R. S.
Rowe, S. T.

Rhyl.
Foulkes, W. H.

Richmond, Surrey.
Clarke, T. M.
Hopwood, T. S.
Mumbray, R. G.

Richmond, Yorks.
Thompson, L.

Riddings, Derby.
Neale, H.
Shaw, A.

Ridgeway.
Archer, A.

Ripley, Derby.
Daykin, K.

Rochdale
Bamford, J. W.
Booth, J.
Hadfield, J.
Mason, A.
*Robinson, R.
Taylor, E.
Turner, H.

Rochester.
Harris, H. W.

Romsey, Hants.
Francis, G.
Blissett.

Ross.
Smith, J.

Rothbury, Northumberland.
Farrage, R.
Riddell, H. B.

Rotherham.
*Davy, H.
France, J.
Greaves, E. (Mexbro')
Johnson, A.

Rothesay.
Duncan, W.
Macintosh, A.

Rothwell.
Ginns, A. B.

Royston, Herts.
Bull, B.
*Matthews, E.

Rugby.
Garratt, S.

Ruthin.
Rouw, W. T.

Ryde, I. W.
Bradley, T. D.
Flower, T. S.
Gurnell, W.
*Pollard, H. H.
Smith, T.

Rye.
Smith, A. W.

Saffron-Walden.
Gilling, J.
Machon, H.
Midgley, J. H.

Saint Asaph.
Roberts, P.

Saint Austell, Cornwall.
Dunn, S.
Geldard, J.
Squire, F. J. C.

Saint Clears.
Williams, R.

Saint David's.
Hughes, H. M.

Saint Day, Cornwall.
Corfield, C.
Corfield, T. J. T.

Saint Helen's, Lancashire.
*Cotton, J.
Sherlock, T.

Saint Ives.
Williams, J. V.

St. Leonards-on-Sea. (See Hastings.)

Saint Neots.
Mellor, J. G.

Salford.
Waugh, J.
Whittaker, E.

Salisbury.
*Atkins, S. R.
Atkins, W. R.
Chamberlain, W. (Downton.)
Orchard, E. J.

Saltaire.
Bayley, G. H.

Saltburn-by-the-Sea.
McLean, K.

Sandbach, Cheshire.
Gee, G.

Sandown, I. W.
Brown, G.

Sandwich.
Baker, F.

Saundersfoot.
Mathias, T.

Scarborough.
Bland, H.
Hackett, J. H.
Simms, R. J.
*Whitfield, J.

Selby.
Cutting, T. J.

Selkirk.
Borthwick, A. J.

Settle.
Brockbank, E.
Watts, W. M.

Sevenoaks.
Romans, T. W. (Wrotham.)

Shanklin, I. W.
Brown, A. H.

Sheffield.
Allen, A. H.
Baker, W.
Bennett, R.
Booth, W. H.
Brown, G. B.
Clayton, W.
Cubley, G. A.
Ellinor, G.
Eyre, S.
Horncastle, H.
Jenkinson, J. H. D.
Le Tall, F. T.
Maleham, H. W.
Newsholme, G. J. W.
Owen, G. B.
Preston, J.
Ward, W.
Watts, L. R.
Wiles, E.
Willmott, W.

Shefford.
Baigent, W. H.

Shepton Mallett.
Cottrill, G. J.
Fudgé, C. W.
Hill, A. A.

Sherborne, Dorset.
Dalwood, J. H.

Sherburn, South Milford, Yorks.
Dove, J.

Shields (North).
Brown, W. H.

Shields (South).
Mays, R. J. J.
Noble, J.

Shipley.
Dunn, H.
Watson, J. H.

Shrewsbury.
Cross, W. G. (Mardol.)
Goncher, J.
Hickin, H. (Mardol.)
Salter, J. B.
Shapley, C.

Sidmouth.
Chessall, R.
Webber, C. F.

Sittingbourne.
Hobbes, A. E. (Milton.)
Gordelier, W. G.
Mangnall, W.

Sleaford.
Heald, B.
Spencer, T.
Weston, G.

Sligo.
Dunwoody, J.

Slough.
Griffith, R.

Snaith, Yorks.
Marsden, T. B.

Southampton.
Adams, A. A. (Woolston.)
Bienvenu, J.
Chipperfield, R.
*Dawson, O. R.
Dowman, G.
Miles, G.
Randall, W. B.
Spearing, J.

Southgate, Middlesex.
Irish, T. C.

South Molton.
Swingburn, R. H.

Southport.
*Ashton, W.
Barton, S. W.
Garside, T.
Gillett, J.
Houghton, W.
Kershaw, J.
Radley, W. V.
Sykes, T. H.

Southsea.
Cruse, T. H.
*Rastrick, R. J.
Stainer, R. W.

Southwell.
Stanley, R. S.

Sowerby Bridge, Yorks.
Cowgill, B. B.
Stott, W.
Walton, M. F.

Spennymoor.
Farthing, T.

Stafford.
Sidley, T. J.

Staines.
Earee, T.

Stalybridge.
Heap, E.
Simpson, A.

Stirling.
Duncanson, W.
Moore, W. J.

Stockport.
Clarke, T.
Hardcastle, T. P.
Hulley, J.
Longley, G.

Stockton-on-Tees.
Clarke, W.
*Brayshay, T.
Brayshay, W. B.
Hall, F.
Jackson, J. H.

Stoke-on-Trent.
Adams, F.
Brown, J.
Fletcher, T.
Shields, J.
Wilson, C. F.
Wilson, W.

Stokesley, Yorks.
Calvert, R.

Stone, Staffordshire.
Slater, T.

Stornoway.
Macpherson, A.

Stourbridge.
Hughes, S.
Jones, R. G. (Lye.)

Stourport.
Tyler, T.

Stowmarket.
Wilson, T.

Stradbroke.
Cridland, E.

Stratford-on-Avon.
Kendall, F.

Strood.
Pienot, C.

Stroud.
Coley, S. J.
*Pearce, J. A.
Smith, D.

Sudbury.
Harding, J.

Sunderland.
Burlinson, T.
Harrison, J.
Harrison, W. B.
Nicholson, J. J.
Potts, E.
Ritson, T.
*Sharp, D. B.
Sidgwick, G. C.
Stoddart, J.
Thompson, H.
Walton, J.

Sutton-in-Ashfield.
Littlewood, S.

Sutton Coldfield.
Smith, W.

Sutton, Surrey.
Potter, H.
Westlake, J.

Swansea.
David, J.
Griffiths, W.
*Grose, N. M.
Lloyd, J. W.
Hill, J.
Morgan, W.
Powell, D.

Swindon.
Green, J.

Taunton.
Field, W. C.
Hambly, C. J.
*Prince, H.

Tavistock.
Gill, W.

Teignmouth.
Cocking, F. J.
Cornelius, J.
Evans, J. J. O.

Tenbury.
Slade, J.

Tenby.
Davies, M. P.

Tenterden.
Willsher, H. S.

Tewkesbury.
* Allis, F.

Thaxted.
Rust, J.

Thirsk, Yorks.
Chrispin, W.

Thorne, near Doncaster.
Knowles, C. W.

Thornley, Ferry Hill.
Galt, W. D.

Thrapstone.
Brown, E. W.
Pars, R. C.
Swift, W. P.
(Raunds.)

Tipperary.
Kennedy, M. S.

Tipton.
Butler, J., junr.
Swinnerton, W.

Tiverton.
Havill, P. W.
Rossiter, G.
Tuck, G. F.

Todmorden.
Buckley, R. C.
*Lord, C.
Stevenson, W.

Torquay.
Bridgman, W. L.
Brown, E. W.
Clarke, R. F.
Cocks, J. W.
Guyer, J. B.
*Hearder, W.
Milne, W.
Shapley, C.
Smith, E.
Watson, D.

Torrington.
Handford, E.

Totnes.
Keen, B.

Tottenham.
Donston, W.
Howard, J. E.

Tow Law.
Bell, F. E.

Tredegar.
Watkins, W. H.

Treherbert.
Jones, R. T.

Trimpley.
Steward, J.

Trowbridge.
Dyer, H.

Tunbridge Wells.
Arnold, S.
Batting, T. G.
Brown, R.
*Cheverton, G.
Dunkley, E.
Nicholson, A.
Sells, R. J.

Tunstall, Staffs.
Alcock, H.
Bennett, S.

Tuxford.
Gain, W. A.

Twickenham.
Peake, H. F.
Shelley, H.

Tynemouth.
Atkinson, J.

Ulverston.
Downward, J.
Willan, R.

Uttoxeter.
Johnson, J. B.
Woolrich, C. B.

Ventnor, I. W.
Weston, C.

Wadebridge.
Philp, J.
Rickard, J. R.

Wakefield.
Carr, J.
Chaplin, J. L.
Job, C. F.
Moorhouse, W.

Wallingford.
Payne, S.
Upton, E. J.

Walsall.
Bayley, J. T.
Highway, H.
*Hobson, H.
Lindop, W. J. (Bloxwich).
Morris, J. O.

Walsham-le-Willows.
Harrington, A.

Walton-on-Thames.
Makins, G. H.
Power, E.

Wanstead.
Baily, J. H.
Rayson, H.

Wargrave.
Soames, W.

Warley, Great, Essex.
Hayes, J.

Warminster.
Rawlings, C. J.

Warrenpoint.
Jones, R. A.

Warrington.
Hargreaves, J.
Webster, S. M.
Young, J. R.

Warwick.
Baly, J.
*Williams, C. J.

Watford.
Chater, E. M.

Wath-on-Dearne.
Hick, A.

Wednesbury.
Gittoes, S. J.
Skirving, G.

Welchpool.
Jones, T. P.

Wellington, Salop.
Bates, J.
Tipton, St. John.

Wellington, (Somerset).
Kelly, R. (Crosscombe.)
Langford, J. B.

Wells.
Manning, R. J.
Slater, J.

Welwyn.
Lawrance, E.

West Bromwich.
See Bromwich, West.

West Cowes, Isle of Wight.
Fennings, A.

West Hartlepool.
Emerson, C.

Weston-super-Mare.
*Gibbons, G.
Kensington, E.

Weymouth.
*Groves, T. B.
Longman, J. H.
Mather, J. H.
Simmons, A.
Targett, C. G.
Williams, J. V.

Whitehaven.
Hunter, H.
Kitchin, A.

Whitstable.
Lawson, E. J.

Wickham Market.
Stainthorpe, W. W.

Widnes, Lancs.
Bennett, J.

Wigan.
Hothersall, J.
Johnson, T.
*Phillips, J.

Wigton.
Hayton, P.

Willington.
Purdy, J. T.

Wilton.
Staples, E.

Wimbledon.
Mellin, J. P.

Winchcome.
Howman, P.

Winchester.
Hunt, R.

Windsor.
Boyce, J. P.
Collins, H. G.
Grisbrook, E.
Russell, C. J. L.

Winsford, Cheshire.
Burgess, R.

Winterton.
Cross, C.

Wishaw.
Macfarlane, T. B.

Withernsea, Yorks.
Hunter, G.

Witney.
Purdue, T.

Woburn.
Clarke, G. B.

Wolverhampton.
Bailey, W.
*Brevitt, W. Y.
Clews, E. J.
Cooley, W. B.
Fleeming, W.
Gow, A.
Hamp, J.
Hartshorne, H.
Jones, E. W. T.
Minshull, M.
Payne, A.
Ratcliffe, W.
Scott, W. L.

Wooler.
Mercer, G. T.

Worcester.
Cooper, J. N.
Ferneley, C.
George, H.
Twinberrow, J.
Virgo, C.
Whitfield, H.

Workington.
Archibald, G. T.

Worksop.
Marris, T.

Worthing.
Burt, J.
Cortis, C.

Wrexham.
Edisbury, J. F.
Rowland, W.

Wymondham.
Skoulding, W.

Yarmouth. *See* GREAT YARMOUTH.

Yeadon.
Blatchley, T.

Yeovil.
*Maggs, T. C.

York.
Ball, A.
Bell, W. H.
Bennett, G.
Clark, J.
Cooper, T.
Dresser, R.
Hey, W. T.
Hood, W.
Moon, R. P.
Oglesby, J.
O'Neill, J.
Parker, T.
Proctor, W.
Saville, J.
Slinger, F.
Thompson, W. M.
Tollinton, R. B.
Walker, J. F.

York Town, Farnborough Station.
Claypole, A. H.

Addresses Unknown.
Allen, W. H.
Archbold, G.
Dale, S.
McColloch, F.
Tuck, W. B.
Wilday.

NOTICE.

Members will please report any inaccuracies in these lists to

PROFESSOR ATTFIELD, *Hon. Gen. Sec.*,

17, *Bloomsbury Square*,

London, W.C.

SOCIETIES AND ASSOCIATIONS

INVITED TO SEND DELEGATES TO THE ANNUAL MEETING.

The Pharmaceutical Society of Great Britain.
The North British Branch of the Pharmaceutical Society of Great Britain.
The Pharmaceutical Society of Ireland.

ABERDEEN.—Society of Chemists and Druggists (1839). A. Strachan, 111, George Street, Aberdeen.
ARBROATH.—Chemists' Association. Mr. W. Pirie, 24, East Abbey St., Arbroath.
ASHTON-UNDER-LYNE.—Ashton-under-Lyne and Dunkinfield Chemists' Association (1869). E. Fisher, 106, Stamford Street, Ashton-under-Lyne.
BIRMINGHAM.—Midland Counties Chemists' Association (1869). Mr. S. Dewson, 90, New Street, Birmingham. Chemists' Assistants' Association (1868). F.G. Homer, Birmingham.
BRADFORD.—Chemists' Association. H. G. Rogerson, Bradford.
BRIGHTON.—Association of Pharmacy. Mr. J. H. Matthews, Brighton.
BRISTOL.—Pharmaceutical Association (re-established 1869). G. F. Schacht, 7, Regent Place, Clifton, near Bristol.
COLCHESTER.—Association of Chemists and Druggists (1845). J. L. Chaplin, 124, High Street, Colchester.
COVENTRY.—Coventry and Warwickshire Pharmaceutical Association. Mr. S. J. Barrett, F.C.S., 75, Hertford Street, Coventry.
DUNDEE.—Chemists and Druggists' Association.
EXETER.—Exeter Pharmaceutical Society (1845). 246, High Street, Exeter.
GLASGOW.—Chemists and Druggists' Association (1854). John Walker, 34, Virginia Street, Glasgow.
GOSPORT.—Y. L. Strachan, High Street, Gosport.
HALIFAX.—Halifax and District Chemists and Druggists' Association (1868). W. C. Hebden, 64, North Gate, Halifax.
HULL.—Chemists' Association (1868). Mr. B. M. Stoakes, Whitefriargate, Hull.
LEEDS.—Chemists' Association (1862). Mr. S. Taylor, 70, Gt. Greorge St., Leeds.
LEICESTER.—Chemists' Assistants and Apprentices' Association (1869). 15, Belvoir Street, Leicester.
LINCOLN.—Chemists' Association. C. F. Gadd, 200, High Street, Lincoln.
LIVERPOOL.—Chemists' Association (1868). T. Williams, F.C.S., Royal Institution, Colquitt Street, Liverpool.
MANCHESTER.—Chemists and Druggists' Association. F. B. Benger, F.C.S., 7, Exchange Street, Manchester.
NEWCASTLE-ON-TYNE.—University of Durham. Chemists' Assistants' Association. Mr. A. Brady, 29, Mosley Street.
NORTHAMPTON.—Chemists' Assistants and Apprentices' Association. G. C. Druce, 6, Drapery, Northampton.
NORWICH.—Chemists' Assistants' Association, 2, London Street.
NOTTINGHAM.—Nottingham and Notts Chemists' Association. Mr. R. Jackson, 52, Bridlesmith Gate, Nottingham.
OLDHAM.—Chemists and Druggists' Assistants and Apprentices' Association. Mr. S. Naylor, Oldham.
PLYMOUTH.—Association of Chemists for Plymouth, Devonport, and Stonehouse. G. Breeze, Catherine Street, Devonport.
SCARBOROUGH.—Chemists' Association (1870). J. Whitfield, F.C.S., Scarborough.
SHEFFIELD.—Pharmaceutical and Chemical Association. Mr. H. W. Malcham, 7, West Bar, Sheffield.
SUNDERLAND.—Chemists' Association. J. J. Nicholson, Sunderland.
TAUNTON.—Chemists' Association (1870). H. Prince, Fore Street, Taunton.
TYNESIDE.—Chemists' Assistants' Association. Mr. G. H. Pavetor.
WOLVERHAMPTON.—Chemists and Druggists' Association. Mr. W. Y. Brevitt, Darlington Street, Wolverhampton.
YORK.—Chemists' Association. T. P. Bulmer, Low Ousegate, York.

PRESENTATION COPIES *of* THE YEAR-BOOK OF PHARMACY *are forwarded to the following :—*

The Honorary Members.

Libraries.

American Pharmaceutical Association; Chemical Society of London; Ecole de Pharmacie, Montpellier; North British Branch of the Pharmaceutical Society; Pharmaceutical Society of Great Britain; Royal Society of London; Société de Pharmacie, Paris; Yorkshire College of Science.

Provincial Associations (having Libraries).

Aberdeen Society of Chemists and Druggists; Arbroath Chemists' Association; Brighton Chemists' Association; Bristol Pharmaceutical Association; Colchester Association of Chemists and Druggists; Coventry and Warwickshire Pharmaceutical Association; Exeter Pharmaceutical Society; Glasgow Chemists and Druggists' Association; Halifax and District Chemists and Druggists' Association; Hull Chemists' Association; Leeds Chemists' Association; Leicester Chemists' Assistants and Apprentices' Association; Liverpool Chemists' Association; Manchester Chemists and Druggists' Association; Midland Counties Chemists' Association; Nottingham and Notts Chemists' Association; Oldham Chemists and Druggists' Assistants and Apprentices' Association; Sheffield Pharmaceutical and Chemical Association; Sunderland Chemists' Association; Wolverhampton Chemists and Druggists' Association.

Journals.

American Journal of Pharmacy; Archiv der Pharmacie; British Medical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie d'Anvers; Journal de Pharmacie et de Chimie; Lancet; Medical Press and Circular; Medical Times and Gazette; New Remedies; Pharmaceutical Journal; Pharmaceutische Centralhalle; Pharmacist; Revista Farmaceutica.

THE FOLLOWING JOURNALS ARE RECEIVED FROM THEIR RESPECTIVE EDITORS :—

American Journal of Pharmacy; Archiv der Pharmacie; British Medical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie d'Anvers; Journal de Pharmacie et de Chimie; New Remedies; Pharmaceutical Journal; Pharmaceutische Centralhalle; Pharmacist; Proceedings of the American Pharmaceutical Association; Revista Farmaceutica.

PROGRAMME OF THE PROCEEDINGS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE,

AT THE

FIFTEENTH ANNUAL MEETING, DUBLIN, 1878.

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G. F. SCHACHT, F.C.S., CLIFTON, BRISTOL.

Vice-Presidents.

Who have filled the office of President.

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W.W.STODDART, F.I.C. F.C.S. F.G.S. Bristol | THOMAS B. GROVES, F.C.S., Weymouth.
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WHITLA, J., L.A., Dub., Monaghan

THE SITTINGS OF THE CONFERENCE WERE HELD AT

The GREAT HALL of the King and Queen's Coll. of Physicians, Kildare Street, Dublin,

ON TUESDAY AND WEDNESDAY, 13TH AND 14TH AUGUST, 1878.

Commencing at Half-past Ten a.m. each day.

MONDAY, 12th August.

The EXECUTIVE COMMITTEE met, according to notices from the Secretaries, at 8 p.m., at the Imperial Hotel, Sackville Street.

TUESDAY, 13th August.

The CONFERENCE met at 10.30 o'clock, a.m., adjourning at 1 p.m.; and at 2.30 o'clock p.m., adjourning at 5 p.m.

Order of Business:

Reception of Delegates.
Report of Executive Committee.
Financial Statement.
Report of Treasurer of the "Bell and Hills" Library Fund.
President's Address.
Reading of Papers and Discussions thereon.

PAPERS.

1. *Report on the Aconite Alkaloids.* C. R. ALDER-WRIGHT, D.Sc. London, J. WILLIAMS, F.C.S., and T. B. GROVES, F.C.S.
2. *Report on Brucia and the Constituents of Strychnos Bark.* W. A. SHENSTONE, F.I.C.
3. *Note on the Volumetric Estimation of some Official Iron Compounds.* H. N. DRAPER, F.C.S.
4. *Notes on Opium.* MR. B. S. PROCTOR.
5. *Soluble Essence of Ginger.* J. G. THRESH, F.C.S.
6. *Nitrite of Amyl.* MR. D. B. DOTT.
7. *Note on Beberia.* MR. D. B. DOTT.
8. *Notes on the Titration of Hydrocyanic Acid and Cyanides, and its Relation to Alkalimetry.* L. SIEBOLD, F.I.C., F.C.S.
9. *The Microscope in Materia Medica.* T. GREENISH, F.C.S.
10. *Miscible Copaiba.* T. B. GROVES, F.C.S.
11. *Baycuru.* C. SYMES, Ph.D.
12. *Authoritative Formulæ for Unofficial Preparations.* F BADEN BENGER, F.C.S.
13. *Solution of Iodoform and Iodoformed Lint.* G. A. KEYWORTH, F.C.S.

Between 1 and 2.30, that is to say, during the mid-day adjournment, all Members attending the Meeting, on invitation of the Local Committee partook of Luncheon in an adjoining room.

WEDNESDAY, 14th August.

The CONFERENCE met at 10.30 o'clock, a.m., adjourning from 1 p.m. till 2.30 o'clock p.m. The whole of the business of the Conference was completed this day by about 5 p.m.

Order of Business:

Reception of Delegates.
Reading of Papers and Discussions thereon.

PAPERS.

14. *Note on an Improved Preparation of Ergot.* A. W. Postans, F.C.S.
15. *A Comparison of the Strength of some of the Cinchona Preparations.* C. Ekin, F.C.S.
16. *The Assay of Cinchona.* Mr. J. B. Smith.
17. *The Extraction of Emetia from the Deposit in* Vinum Ipecacuanhæ. G. Brownen, F.C.S.
18. *Adulteration of Drugs.* C. R. C. Tichborne, LL.D., etc.
19. *Notes on the Methods of distinguishing Carbolic Acid, Cresylic Acid, and Creasote.* A. H. Allen, F.I.C., F.C.S.
20. *On a Reaction of Orange Flower Water.* R. Reynolds, F.C.S., and Mr. C. H. Bothamley.
21. *Notes on Various Samples of Dialysed Iron.* R. Reynolds, F.C.S., and Mr. C. Bothamley.
22. *Preliminary Examination of Pituri or Pitchere.* A. W. Gerrard, F.C.S.
23. *Note on the Preparation of Phosphorus Pills.* A. W. Gerrard, F.C.S.
24. *A Chemical Compound of Hydriodate of Quinia and Iodide of Bismuth.* Mr. C. W. Fletcher.
25. *Laboratory Notes.* Mr. H. Barton.
26. *Note on Reichert's Improved Thermo-Regulator.* C. Symes, Ph.D.

Place of Meeting for 1879.

Election of Officers for 1878–79.

Between 1 and 2.30, that is to say, during the mid-day adjournment, all Members attending the Meeting, on invitation of the Local Committee partook of Luncheon in an adjoining room.

THURSDAY, 15th August.

The Members of the Conference, on invitation of the Irish Committee, went for a most enjoyable excursion to Glendalough, or the Seven Churches, after which they were entertained at a sumptuous banquet served in the Exhibition Palace.

BRITISH PHARMACEUTICAL CONFERENCE.

MEETING IN DUBLIN, 1878.

THE Fifteenth Annual Meeting of the British Pharmaceutical Conference commenced on Tuesday, August 13th, in the Great Hall of the King and Queen's College of Physicians, Kildare Street, Dublin, under the presidency of Mr. G. F. Schacht, F.C.S., of Clifton.

The following members and visitors were present during the meetings:—

Barnsley.—T. and Mrs. Lister. *Bath.*—C. Ekin.

Belfast.—T. Ball, M.D., J. J. Gosgar, F. Hodges, J. C. C. Payne, R. W. Pring, H. Whitaker, M.D., W. Whitla, M.D.

Boston, U.S.—Prof. Markoe. *Bray.*—A. E. Doran.

Brighton.—W. D. Savage.

Bristol.—J. Pitman. *Castlebar.*—H. J. Diver.

Cheltenham.—W. Barron. *Chester.*—G. Baxter.

Clifton.—W. Barry, O. Giles, R. M. Hatch, G. F. Schacht.

Cork.—W. Haughton, T. R. Lester. *Droitwich.*—E. Taylor.

Dublin.—W. Allen, W. N. Allen, jun., P. T. Bemingham, E. J. Boileau, J. G. Boileau, S. Boyd, Dr. Browne, J. E. Brunker, J. P. Cavenagh, T. Churchill, T. Collins, H. Conyngham, H. N. Draper, G. F. Duffey, M.D., J. Durham, M. Eustace, J. Evans, J. M. Finney, F.C.P., J. Goodwin, G. H. Grindlay, T. L. W. Grimshaw, M.D., C. A. G. Gubbins, R. Gun, J. P. Harold, W. Harold, C. H. Hartt, E. M. Hodgson, J. T. Holmes, J. Jackson, A. H. Jacob, M.D., S. Knaggs, J. P. Lawton, G. M. MacSwiney, F.C.P., R. Montgomery, W. Murphy, J. J. O'Brien, S. Oldham, J. W. Queale, Prof. Quinlan, M.D., J. A. Ray, J. Emerson Reynolds, M.D., Dr. Roche, R. Simpson, J. T. Smallman, Aquilla Smith, M.D., William Smythe, G. Smith, M.D., R. Swayne, Prof. Tichborne, W. F. Wells, jun.

Edinburgh.—G. H. Laird. *Exeter.*—A. Hunt.

Galway.—Prof. Rowney. *Gateshead.*—H. B. Brady.

Glasgow.—D. Frazer, E. C. C. Stanford.

Gloucester.—H. Meadows, W. Stafford.

Grantham.—A. G. Gamble. *Huddersfield.*—G. W. Rhodes.

Leamington.—J. Barnett. *Leicester.*—J. W. Clark.

Liverpool.—T. F. Abraham, A. H. Mason, R. Sumner, Dr. C. Symes, A. E. Tanner, T. Williams.

Limerick.—T. S. Hance.

London.—Prof. Attfield, J. Bourdas, F. Bullock, S. M. Burroughs, S. Carter, E. Crawshaw, J. F. Davenport, R. H. Davies, J. Dodwell, F. W. Fletcher, A. W. Gerrard, Dr. J. H. Gladstone, T. Greenish, W. Gulliver, W. E. Heathfield, W. Hills, A. B. Lewinton, H. Long, N. Maughan, F. Passmore, Dr. B. H. Paul, A. P. Penrose, A. W. Postans, J. Robbins, A. L. Savory, Dr. A. Senier, H. G. Stacey, C. Umney, J. Williams, J. A. Wink, A. C. Wootton, T. P. Wright.

Londonderry.—S. J. Byrne.

Kilkenny.—W. Sterling. *Kingstown.*—H. Bennett, F. Meyers.

Manchester.—F. Baden Benger, C. Estcourt, T. G. Gibbons, T. Mather, Prof. Roscoe, L. Siebold, W. Thomson.

Newry.—W. R. Hamilton. *Northampton.*—W. D. Mayger.

Oldcastle.—P. Gaynar. *Shepton Mallet.*—G. J. Cottrill.

Sheffield.—A. H. Allen, W. Ward.

Southampton.—R. Chipperfield. *Swansea.*—W. Morgan.

Warrenpoint.—R. A. Jones. *Weymouth.*—T. B. Groves.

Whitehaven.—F. T. Allatt. *York.*—F. Slinger.

Meeting of the Executive Committee.

On Monday Evening, August 12th, a meeting of the Executive Committee was held. Present—Mr. G. F. Schacht, *President;* Messrs. Brady, Groves, Pring, and Williams, *Vice-Presidents;* Mr. Ekin, *Treasurer;* Professor Attfield and Mr. Benger, *Hon. Gen. Secs.;* Dr. Senier, *Assist. Sec.;* Mr. Hayes, *Local Sec.;* and Messrs. Draper, Umney, and Holmes.

The Year-Book.—The Senior Honorary Secretary reported that, in accordance with the instructions of the Committee which met in December last, the Editorship of the *Year-Book* for 1878 had again been offered to Mr. Siebold, and again accepted by that gentleman. The manuscript would, in fact, be placed on the table at the general meeting next day; and the completed volume would this year probably be in the hands of members on the date originally promised, namely, December 1st.

Invitation to Membership.—The Senior Honorary Secretary reported that a circular of invitation to membership, addressed to all persons interested in Pharmacy in Ireland, had been printed and distributed, the result being a considerable addition to their list of members.

He also reported that the usual period had elapsed since an invitation to membership had been addressed to the general body of pharmacists in Great Britain, and that he had in hand a sufficient balance of money from last year to pay the costs of such a canvass.

On the motion of the President, instructions were given to Professor Attfield to issue such an invitation in the latter part of the current Conference year.

Financial Statements.—The Senior Honorary Secretary submitted his debtor and creditor account for the past year, duly audited.

The Treasurer submitted his account with the General Fund, and with the Bell and Hills Library Fund, duly audited.

These accounts were approved, and ordered to be presented to the members at the Annual Meeting.

Programme of Proceedings, Dublin Meeting, 1878.—The Senior Honorary Secretary submitted to the Committee a draft programme of proceedings at the meetings to be held on the following days. It included two research reports, twenty-four titles of papers, and one subject for discussion.

Respecting the research report on the Aconitines, Mr. Groves and Mr. Williams stated that the whole of the work done during the past year had been carried on by their colleague, Dr. Wright. They thought that though the work might still be continued, it would be unnecessary to re-appoint the Committee of three.

Respecting the subject for discussion, the Senior Honorary Secretary reported that he had received a note from a member, offering an abstract of matter which, though it had previously been published, might elicit useful discussion. The President said that although it had not been their practice to introduce discussions other than those following original papers, he would suggest that they take this discussion, if there were time, after the original papers had all been read.

After some revision, the first edition of the programme was agreed to, and despatched to the printers.

Report of Executive Committee.—Mr. Benger submitted a draft report, which was adopted for presentation to the members on the following day.

Members in Arrear.—The names of some members several years in arrear were ordered to be removed from the official list. In reply to a question, the Secretaries explained that three or four applications for their subscriptions had annually been addressed to the defaulters. A *Year-Book* was never sent to a member unless the subscription for that year had been paid.

New Members.—One hundred gentlemen were elected to membership at this Committee meeting :—

Abraham, Mr. T. F., Liverpool.
Allen, Mr. C., Sydney, N.S.W.
Allen, Mr. W., Dublin.
Beatty, Mr. J., Ballymena.
Beggs, Mr. G. D., Dalkey.
Bell, Mr. W. H., Forest Hill.
Blissett, Mr., Romsey.
Booth, Mr. C. W., Sydney, N.S.W.
Bowman, Mr. D., Carrickfergus.
Boyd, Mr. S., Dublin.
Brunker, J. E., M.A., Dublin.
Burges, Mr. F. C., Fethard.
Byrne, Mr. S. J., Londonderry.
Bush, Mr. L. B., Sydney, N.S.W.
Carter, Mr. A., Sydney, N.S.W.
Clotworthy, Mr. S., Belfast.
Collier, Mr. H., London.
Connor, S., M.R.C.S., Newry.
Conolly, Mr. S. T., Athy.
Cooke, P. M., L.M. etc., Enniscorthy.
Corley, Mr. W. B., Wolverhampton.
Coulter, Mr. J., Belfast.
Croly, Mr. T. H., Ballyeroy.
Coyne, Mr. J., Crossmaglen.
Curfew, Mr. J., Hyde.
D'Albites, Mr. H. A., Sydney, N.S.W.
Devens, Mr. H. J., Castlebar.
Diack, Mr. J. M., Dublin.
Dobbin, Mr. W., Belfast.
Doran, Mr. A. E., Bray.
Dunnoody, Mr. J., Sligo.
Filson, Dr. A., Portaferry.
Foster, W., B.A., F.I.C., London.
Froodman, Mr. F., Dublin.
Gardner, Mr. A. W., Canterbury.
Gaynor, Mr. P., Oldcastle.
Gosgar, Mr. J. J., Belfast.
Goulding, Mr. W., M.P., Cork.
Griffin, Mr. C. H., Dublin.
Grindley, Mr. G. H., Dublin.
Gutheridge, Mr. G. F., London.
Hartford, Mr. J., Dublin.
Henry, Mr. T., Monaghan.
Hey, Mr. W. T., York.
Hicks, R., M.R.C.S., Ramsgate.
Hillock, Mr. J., Armagh.
Howlett, Mr. H. J., Portsmouth.
James, Mr. J. R, Hanover St., W.
Jones, Mr. T. P., London.
Jones, Mr. R. A., Warrenpoint.
Kennedy, Mr. M. S., Tipperary.
Kensington, E., F.C.S., Shepton Mallet.
Laird, Mr. J., Limerick.
MacEwen, Mr. W., Monte Video.
MacMomas, Mr. J. H., Longford.
McMullan, Mr. T., Belfast.
Marshall, Mr. W., Dublin.
Mason, Mr. W. B., Bolton.
Medcalfe, Mr. B. P., London.
Millington, Mr. W. S., Acton.
Morrow, Mr. B., Downpatrick.
Murphy, Mr. W. C., Dublin.
Murray, Mr. E. P., Clones.
Nairne, Mr., Glasgow.
Nugent, Mr., Dublin.
Olver, Mr. W. R., Dubbo, N.S.W.
Park, Mr. W. S., Dublin.
Phillips, Mr. B., India.
Porter, Mr. G., Sydney, N.S.W
Purcell, Mr. T. F., Sydney, N.S.W.
Queale, Mr. J. W., Dublin.
Reynolds, Mr. W. J., Clonmel.

Reynor, Mr. A., Dublin.
Robinson, Mr. J. O., Clontarf.
Scriven, Dr. J. S., Duffield.
Seymour, Mr. T. T., Ennis.
Shaw, Mr. J. W., Kensington.
Stacey, H. G., F.C.S., London.
Stafford, Mr. W., Gloucester.
Staunton, Mr. G. H., Portarlington.
Steele, Mr. J. C., Goranhill.
Sterling, Mr. W., Kilkenny.
Stoney, Mr. J. D., Dublin.
Street, Mr. G., London.
Taaffe, Mr. H., Londonderry.
Thompson, Mr. L., Lisnaskea.
Thompson, Mr. S. M., Dublin.
Turner, Mr. J. C., Sydney, N.S.W.
Vance, Mr. J. U., Bray.
Vance, Mr. W. N., Bray.
Walters, Mr. J., Kilkenny.
Ward, Mr. W., Sheffield.
Watt, Mr. A. J., Sydney, N.S.W.
Wells, Mr. F., Junr., Dublin.
Whitfield, Mr. J. G. P., Cork.
Wing, Mr. L., Chislehurst.
Williams, Mr. E., Brixton.
Woodland, Mr. J., London.
Woolnough, Mr. H. A., Hong Kong.

GENERAL MEETING.

Tuesday, August 13th.

Letters from Absent Members.

The President called on the Senior Honorary Secretary to read some letters which he had received from members who were unable to be present.

Professor Attfield then read letters from Messrs. Bentley, Carteighe, Proctor, Redwood, Reynolds, E. Smith, Stoddart, and Tilden.

Reception of Delegates.

The Hon. Sec. read the following list of delegates to the Conference:—

American Pharmaceutical Association and the Massachusetts College of Pharmacy.—Professor Markoe.

Parmaceutical Society of Great Britain.—The President (Mr. J. Williams), the Vice-President (Mr. W. D. Savage), the Treasurer (Mr. T. Greenish), and Messrs. D. Frazer and J. Robbins.

Pharmaceutical Society of Ireland.—The President (C. R. C. Tichborne, LL.D., Ph.D.), Messrs. W. Allen, J. G. Boileau, J. E. Brunker, M.A., T. Collins, M.R.C.S., J. Goodwin, W. Hayes, J. T. Holmes, S. Oldham, J. C. C. Payne, R. W. Pring, L.A.H., J. Whitla, L.A.H.

Edinburgh (North British) Branch of Pharmaceutical Society of Great Britain.—Dr. Stevenson Macadam, and Messrs. Laird and Wink.

Bristol Pharmaceutical Association.—Messrs. J. Pitman and G. F. Schacht.

Glasgow Chemists and Druggists' Association.—Messrs. E. C. C. Stanford, F.C.S., and D. Frazer.

Leicester Chemists' Association.—Mr. J. W. Clark.

Liverpool Chemists' Association.—Messrs. T. F. Abraham, R. Sumner, and A. H. Mason.

Nottingham and Notts Chemists' Association.—Mr. J. Rayner.

Sheffield Pharmaceutical Association.—Mr. Ward, F.C.S., as the bearer of an invitation to the British Pharmaceutical Conference to meet in Sheffield next year.

The Report of the Executive Committee was read by Mr. F. Baden Benger, F.C.S., as follows:—

Report of the Executive Committee.

The period of our Annual Meeting so nearly comprises the whole of the transactions of the Conference, and these are so fully reported in our published proceedings, that there remains little beyond the record of formal business, and uninteresting details of secretarial work to include in the Committee's report.

The position of the Conference continues satisfactory. Some inevitable loss of members has taken place, but many new names have been enrolled, and the financial statement will show a considerable balance in hand.

The wide interest felt in the Conference and its aims by those connected with pharmacy throughout Ireland has been evidenced in the very hearty efforts put forth to ensure the success of this our first meeting in Ireland by the body of gentlemen forming the Irish Committee, and your Committee regards with pleasant anticipation the prospect of obtaining fresh workers in this new field. At a meeting of your Committee held at Plymouth last year, a discussion was raised by Mr. Schacht—then Treasurer—respecting the nature of the securities in which the Bell and Hills Library Fund was invested, and a resolution, proposed by Mr. Ekin and seconded by Mr. E. Smith, was carried—"That the Russian bonds in which the Bell and Hills Fund is invested be sold, and the proceeds re-invested in Consols." It was further resolved, on the motion of Mr. John Williams, seconded by Mr. Umney—"That the Treasurer transfer from the General Fund to the Bell and Hills Fund, such a sum as may be necessary to allow of that Fund yielding, when invested in Consols, a clear ten pounds annually;" and at a subsequent meeting of the Committee, held in London on December 5th, Mr. Schacht reported that in accordance with the instructions of the Committee conveyed in these resolutions such transfers had been accomplished. It will doubtless afford gratification to members that a sum from the General Fund should have been used to render permanent the Bell and Hills Fund, so generously established by Mr. Hills.

At this meeting of the Committee, Professor Attfield reported that, in accordance with the wishes of Mr. Thomas Hanbury, and with the instructions of the Committee, he had sent a copy of "Pharmacographia" and of the late Daniel Hanbury's "Science Papers" to the libraries of the Pharmaceutical Associations of Bath, Birmingham, Nottingham, Exeter, Liverpool, Edinburgh, Brighton, Bradford, London, Bristol, Glasgow, and Plymouth; and that he had received very hearty acknowledgments from the officers of the

respective Societies. A printed copy of the following statement had been placed inside the cover of each book :—

"In 1877 Thomas Hanbury, Esq., in memory of his late brother, Daniel Hanbury, F.R.S., presented thirty copies of each of these books to the Executive Committee of the British Pharmaceutical Conference, with a request that a copy of the 'Science Papers' and of 'Pharmacographia' should be given to the library of the Pharmaceutical Association of every one of the fifteen towns in which the Conference had already met, or where it would assemble during the succeeding fifteen years."

The senior Secretary, Professor Attfield, was instructed to write to Mr. Siebold as soon as the editorial work of the current year was completed, offering him the editorship for the year 1877–8 on certain conditions as to the date on which the work should be completed. After some correspondence on the subject these terms were accepted by Mr. Siebold.

Dr. Alfred Senier was appointed Assistant-Secretary, at a salary of £40 per annum, to commence from November 1st, 1877.

Professor Attfield submitted a proof of a circular of invitation to membership, proposed to be sent to all persons interested in pharmacy in Ireland, provided such action met with the approbation of the Irish Committee then being formed to promote the success of the meeting in Ireland in 1878. The Committee accepted the proof, and ordered copies to be printed and circulated, subject to the wishes of the Irish Committee.

Accounts of receipts and disbursements since the last meeting of the Committee were submitted by the Secretaries.

Early in the present year a revised edition of the "Blue List" of subjects suggested for investigation was issued to members. This list included only subjects possessing more or less special pharmaceutical interest, it being considered desirable to encourage as much as possible the presentation of papers bearing closely on pharmacy.

It has been found advisable in the past, at intervals of every four or five years, to issue to all registered chemists and druggists not already members of the Conference a circular setting forth prominently the objects of the Conference and the terms of membership. This course invariably results in a large accession of new members, and becomes necessary as from various causes old ones fall away. It is proposed to utilize the balance in the hands of the senior Secretary by the issue of such a circular during the present year; and your Committee trust that this means, combined with the efforts of those members who feel an interest in the subject, will again considerably increase the numerical strength of the Conference.

The financial statement was then read:—

The General Fund.

The Senior Hon. Secretary in Account with the British Pharmaceutical Conference.

1877–78. *Dr.*	£.	s.	d.
To Sale of Year-Books by Secretary	7	17	6
,, ,, ,, Publishers	25	0	0
,, Advertisements in 1875 vol.	0	12	0
,, ,, 1876 vol.	50	19	0
,, ,, 1877 vol.	137	17	0
,, Subscriptions from Members	757	8	1
	£979	13	7

1877–78. *Cr.*				£	s.	d.
By Expenses connected with Year-Book:—						
Butler & Tanner for printing, binding, and banding	£432	14	1			
Editor's Salary	150	0	0			
Messrs. Churchill:—						
Commission on Advertisements	47	7	0			
Advertising Year-Book	2	12	0			
Wooden Blocks for Illustrations	8	0	0			
Delivery to Members	69	9	7			
Foreign Journals (Nutt)	3	2	6			
				713	5	
,, General Printing:—						
Butler & Tanner	7	2	6			
Stevens & Richardson	18	2	0			
Parkins & Gotto	3	1	0			
				28	5	6
,, Directing Circulars and Envelopes				5	4	9
,, Assistant-Secretary's Salary				40	0	0
,, Postage (about 11,000 letters)				45	9	2
,, Sundries, including new Office Books				16	0	6
,, Expenses of Meeting at Plymouth				24	17	4
,, Revising Blue List				5	5	0
,, Grants in Aid of Research				25		0
,, Balance in hand				76	6	
				£979	13	7

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

1877.	*Dr.*	£	*s.*	*d.*
To Balance in hand on July 1, 1877		65	9	2
July 10. To Dividend on £400 3 per cent. Consols		5	18	6
Aug. 17. ,, Sale of £200 Russian Bonds		159	5	0
1878.				
Jan. 10. To Dividend on £600 3 per cent. Consols		8	17	3
		£239	9	11

1877.	*Cr.*	£	*s.*	*d.*
Nov. 27. By Purchase of £200 3 per cent. Consols at 96⅝		194	5	0
,, Expenses and Powers of Attorney		1	7	6
,, Dividend on £350 3 per cent. Consols transferred to Bell and Hills Fund		10	10	0
,, Balance in hand		33	7	5
		£239	9	11

		£	*s.*	*d.*
Assets July 1, 1877	Cash in hand	33	7	5
	Consols (stock)	250	0	0

The Bell and Hills Library Fund.

The Hon. Treasurer in Account with the British Pharmaceutical Conference for Year ending June 30, 1878.

1877.	*Dr.*	£	*s.*	*d.*
To Balance in hand on July 1, 1877		5	4	1
,, Dividend on £350 Consols transferred from General Account		10	10	0
		£15	14	1

1878.	*Cr.*	£	*s.*	*d.*
June. By Dr. Attfield for Purchase of Books for Dublin		10	10	0
,, Balance in hand		5	4	1
		£15	14	1

		£	*s.*	*d.*
Assets July 1, 1878	Cash in hand	5	4	1
	Consols (stock)	350	0	0

Examined and found correct, { S. B. Turney, Plymouth, / W. Allen, Dublin, } *Auditors.*

On the motion of the PRESIDENT, seconded by Professor TICHBORNE, the report and accounts were received and adopted.

THE DONATIONS OF BOOKS.

Professor ATTFIELD said he had, according to rule, written to the officers of the Pharmaceutical Society of Ireland, offering on behalf of the Conference to present to the Library of the Society, if it possessed one, books to the value of ten guineas from the Bell and Hills Library Fund. He had received an answer that the Society would gladly accept the books, and that Dr. Tichborne was deputed to select the books which the Society would like to possess. Unfortunately the list had not reached him in time to get the books bound and to lay them on the table at that meeting. He had also to announce that through the generosity of Mr. Thos. Hanbury, he was able to add a bound copy of the "Pharmacographia" and of Mr. Daniel Hanbury's "Science Papers."

Professor TICHBORNE, as President of the Pharmaceutical Society of Ireland, moved that the members of that Society present in the room should pass a vote of thanks to the Trustees of the Fund for this handsome present; this was seconded by Mr. DRAPER, and carried unanimously.

The PRESIDENT then read the following address :—

THE PRESIDENT'S ADDRESS.

The "Past" of Pharmacy was set before us by our President of last year with so much success, that I felt strongly impelled to attempt this year a grasp at its "Future."

My presumption met with its natural reward. Not for the first time in the history of human folly, the effort to penetrate the impenetrable failed. A kind of hope, however, gradually arose, that if the effort were directed to a search for the spirit that guides the work of the present, and to signs of connection, if any exist, with that of the past, suggestions might arise worthy of acceptance as shadows of things to come. At any rate, some beneficial hints might be gathered from a good straight look into things as they are. In a somewhat inconsequent and illogical way, but in the order in which my own mind was swayed, I place before you the grounds upon which this idea was based.

The future, then, is silent and refuses to answer; can we turn for light elsewhere? What says the wisdom of the past? "That which has been will be." What says the wisdom of the present?

"To-morrow is the offspring of to-day." Can these words of wisdom help us?

A man becomes what the prevailing habit of his mind impels him to be. Societies become what the prevailing habit of the strongest minds among them impel them to be. Let us call this habit of mind, Tone. Shall we define "tone" to be the name for an unwritten code, self-imposed and acting through the sentiments of honour and shame? So far, well; but what is the impulse that at once determines submission to this code, and declares the line at which honour yields and shame prevails? Sense of duty. Duty? The word has but four letters, but with what infinite variety of significance is it regarded.

For the definition of the scope of a man's duty lies absolutely with himself. To one, the petty concerns of his own being suffice to furnish the limit; and he is content, in a dull way, to work that he may eat. To another, the entire stretch of the visible horizon fails to include all that conscience declares to have a claim upon his life, and even when fainting strength can do no more he weeps himself out "an unprofitable servant." The average man takes his place somewhere between these two extremes: not quite so dull, but he acknowledges vaguely that others have rights as well as himself; not quite so pure, but he has to admit that "ego" still stands to him as of prime importance.

But arranged in whatsoever number of groups we will, the individual claims the right to read his own case, to estimate the bearings of all its complex surroundings, and to declare the resulting sum of his obligations; and who shall presume to gainsay that right?

Are we not then at the very outset confronted by a great dilemma?

How mistaken may every conclusion as to the inner life of a community be, which is in any way founded upon a supposed general deference to duty, the word having a different meaning for every individual. And, on the other hand, how hopeless must be the effort to urge upon one's neighbours any other idea of that obligation than the one by which they are already possessed.

Possibly this may be so; but is it not more distinctly true that no man can claim to stand in this world alone? Is not his case of necessity part and parcel of other cases? do not his conditions and surroundings envelop other lives, and his decisions and conduct affect other interests as well as his own? Most surely is this true, and of no portion of his life is it more plainly true than that which is termed his "business avocation," in which perhaps many others are labouring with equal anxiety, and whose interests therein are

equally grave. Indeed a man's business avocation may be fairly regarded as the school of his adult life, in which qualities and aspirations for good or evil become developed and confirmed. If the tone of that school be low, the man and his avocation alike become degraded; if it be high, both are in some measure led upward toward honour.

Pharmacy is the school of our adult lives. If the tone of pharmacy be high, both we and pharmacy will be led upward.

Our future, then, depends upon our present:—what is our present?

Let us take up a parable, and call it "The Business Life of a Pharmacist." Let the incidents be gathered, neither from the life of any particular individual nor from our own imaginings, but from the facts that lie around us; and let us arrange them in the form of a personal narrative, "The Business Life of a Pharmacist."

I left school when between fifteen and sixteen years of age. It was a good average private school. We were there taught English, Latin and Greek, French, mathematics, and the rudiments of physical science. We were trained kindly and with an evident desire to make us good as well as capable lads. It was arranged that I should become a pharmaceutical chemist, and that I should be apprenticed to a gentleman in business in a certain provincial town of some size and importance.

My selected master (whom I shall in future call my mentor), having considered all he could gather about me from my friends and from my late school, and being fairly satisfied, required me to pass the Preliminary examination of the Pharmaceutical Society. I remember my guardian speaking of this requirement as a "new-fangled bit of nonsense," and so afterwards did some of the lads who went in with me for the examination; but my mentor was quite clear upon the point, urging "that if the young gentleman's mental powers were unequal to the moderate requirements of that test, it would be wiser to refer him back for a few more terms to his schoolmaster." I came through the trial with fair credit, though, to my surprise, about 50 per cent. of my companions on that occasion were rejected.

One of the first systematic tasks assigned to me was to spend two hours every morning copying from a "prescription book," carrying out in full, by the aid of dictionary and grammar, all the abbreviations and translating them into English. I was also required to refer to books on materia medica and others, and to read about every article named in the prescriptions. Once a fortnight a short

examination served to keep my attention alive to the work. But I was chiefly occupied with what I soon began to call, with some pouting, the drudgery of the shop,—wrapping and folding and putting up articles of stock for sale,—until, indeed, I ventured a bit of a grumble.

My mentor listened, with a quiet smile, and assured me that when I could wrap three consecutive ounces of light carbonate of magnesia into three similarly-shaped and equally neat parcels I should be excused wrapping for a whole month.

I am not sure that I ever achieved the task, but I soon ceased to regard such work with any distaste, for I saw that it had to be done, and the growing dexterity of my fingers rendered it day by day less irksome.

My work also soon came to be varied by occasional employment in the laboratory. We there carried on a good deal of drying, grinding, powdering, sifting, infusing, macerating, pressing, straining, extracting, distilling, etc., etc.; for my mentor said, in answer to some one's expression of surprise, that "although doubtless there were many amongst those of whom he could buy the manufactured article who were quite as clever and quite as honest as himself, still his customers confided in him and not in some individual utterly unknown to them, and he thought it right to be able to vouch by personal knowledge for the integrity of, as nearly as possible, every thing he gave them." So there was a good deal of work done (on a small scale) in my mentor's laboratory, and I became familiarized with processes of interest, both scientific and commercial.

In the second year of my apprenticeship—and when my reading and experience had opened my mind in some degree to the qualities and properties of the materials I had to deal with—I was required to attend a course of lectures on systematic chemistry, and in the following year a course upon botany and materia medica; and my mentor was careful to see the contents of my note book and to have me copy them out in full with the aid of text-books, requiring me in the one case to make drawings of the apparatus used in the experiments, and in the other case, marginal illustrations of the parts of plants described and graphic descriptions of the technical terms employed by the lecturer. "For," said he, "this will assure both yourself and me that you have understood what you have seen and heard, and it will assist wonderfully in stamping these essential matters into your memory."

That course of lectures on chemistry was for me an important one, for it was during its delivery that I first fell in love. The "smite"

occurred in this wise. With more or less effort I had followed the lecturer through perhaps the first half of his course regarding every fact and phenomenon he put before us as so many bits of information to be painfully remembered, till one eventful morning when it became his duty to expound the chemistry of the voltaic pile. As, in the course of that explanation, he proceeded to dilate upon that strange wonder, the parallelism of the phenomena that occur in the generating and in the experimental cells, a screen seemed suddenly to fall from around my senses, and I felt for the first time in my life that there was a meaning in the relations of things, the mere cognizance of which was a delight.

Utterly undefinable as that impression then was, it served to give a perfectly new impulse to all that portion of my work. It was the first sweet taste of a spring of wholsome enjoyment that has never since failed, and for whose refreshment I hope I shall never cease to feel grateful. I had fallen in love with the fair Spirit of Science and had reaped the usual result of such a plunge; I had got one step nearer to Heaven.

I was very anxious to dispense long before I was allowed to do so. But my mentor said very gravely, "Remember, if you please, trusting you to dispense is trusting you on the one hand with *my* reputation, and possibly with my very commercial existence, and on the other hand with the safety and existence of the public. It becomes my clear duty, therefore, to withhold that trust until I have full assurance that you deserve it. A dispenser must not only be capable of absolute correctness himself, but he must also be capable of detecting any error of ignorance or accident on the part of the prescriber; special qualifications of knowledge, training, and even of character, are required in a good dispenser. I admit these qualifications are growing up within you, but they are scarcely yet sufficently pronounced to justify the trust."

The proper time came in due course, but I have ever felt the responsibility of that portion of my work and have gratefully adopted any aids to safety that have appeared to promise well.

About this time I began to acknowledge the wisdom of one condition of my apprenticeship that had at first appeared a little arbitrary. When its terms were being first discussed I felt unwilling to be bound for so long a period as four years. But my future mentor urged the point with some earnestness, and of course it was yielded. "There is no school for the pharmacist," he said, "equal to that of the pharmacist's shop. Three years is all too short a time in which to master its details; four years is more than

30 per cent. better. The healthiest plants are those which are not unduly forced." This, the first argument I ever heard him use, was a fair illustration of one of the special qualities of his character. He thought everything that had to be done worthy of the amplest pains. Nothing was allowed to be slurred. Every article purchased was the best that he could select, and many a parcel of goods, once perfect, have I seen him throw into the dust-bin, because it had begun to show signs of change. All suggested new processes were tried, and if found to be improvements were adopted. In every case of doubtful prescribing, trouble to any extent was taken to find out the prescriber's intention. To this end I had frequently to spend hours in finding out the doctor and getting him to review his prescription. Occasionally these efforts were wrongly interpreted, and we even received the reverse of thanks for our pains; but the comment and consolation of my chief were invariably the same: "Never mind, it was the right thing to do."

As time went on I had full opportunity of seeing that, though not quite always appreciated as I thought he deserved, my mentor was much trusted and (at times) consulted by his customers and neighbours, and I had frequently to assist him in matters that appeared to lie somewhat outside the usual run of business. He appeared to think these fit opportunities for narrating such bits of experience as he thought might be of use to me. I made memoranda of these as they occurred and as they were told, and find they present a strange mixture of subjects.

I have notes of—

1. *Cases of analysis*, including those of waters, manures, minerals, chemicals, articles of food, samples of healthy and of diseased secretion, etc.

2. *Cases of suspected poisoning*, happily not one case of real poisoning.

3. *Cases of emergencies*, arising from accidents, such as falls, wounds, burns, injuries from machinery, etc.

4. *Cases requiring urgent medical advice*, of all degrees of importance, from toothache to cholera and delirium.

5. *Cases demanding professional sympathy* rather than medical help, and which had for their scenes and times the last moments and the deathbeds of suffering and distress.

6. *Cases of consultation upon matters commercial, professional, and domestic*, which refuse to be grouped, but which required knowledge, judgment, and secrecy.

I showed my mentor this bundle of memoranda just before I left

his house, and he was glad I had preserved them. "More especially," he said, "for this reason. You will see in them how curiously varied is the public demand upon us pharmacists, and how curiously are our labours sometimes valued. The shop on our right is a draper's, and that on our left is a bookseller's, and their proprietors are known to be as good and as worthy men as ourselves, but the public demand nothing from them but drapery and books. Ours is a pharmacist's, and in addition to the supply of drugs, chemicals, and medicines, the same public *looks to us as if by right* for prompt practical help in many of its difficulties and in much of its trouble. We are supposed to be tender of heart, but with nerves drilled as a surgeon's; prompt and self-possessed in emergency, but content to retire and be forgotten when the professor appears upon the scene. Our knowledge must be large and our tempers sweet, but withal we must never forget that we are shopkeepers; what of the battle of life we have to do must be done in the trenches rather than in the arena. Well, let us accept our *rôle;* a campaign may be won as much by the pickaxe and spade as by the sword and rifle."

At the conclusion of my apprenticeship my mentor advised me to devote a year exclusively to scientific study. "Adopt which school you prefer, only let it be one in which your mind and intellect may be trained and drilled as well as informed, strengthened to acquire rather than inflated with knowledge. This is the purpose of all good education. There are Schools of Pharmacy of both kinds, and, as a rule, by their fruits we know them." So I made my selection with what care I could, and spent ten months in the way he advised, and then passed the examinations, Minor and Major, of the Pharmaceutical Society.

Once more deferring to the advice of my old friend and mentor, I sought and obtained a situation at one of the "historic houses" of pharmacy. Here I remained nearly three years, gaining much experience and making some valuable friendships.

A favourable opportunity for commencing business on my own account then occurred, and I became an independent pharmacist.

I have had hard work for some years and ultimately have achieved fair success, and I have been lately honoured by an invitation to sit at the Board of Examiners of the Pharmaceutical Society.

I hope some day to be able to accept this crowning honour to my professional career.

There ends our autobiography: a plain unvarnished tale, of

commonplace material enough, let us hope, to fit the experience of all.

And I again address you, gentlemen, in my proper person.

It is, I think, an every-day story; yet as I review it I detect a something which when clothed in human form presents a figure of some significance in our present search.

The form is that of a man, charged with an exalted idea of duty, filled with human sympathy, well informed in general knowledge, accurately informed in the special knowledge of his art, with habits drilled to exactitude and care, and fingers trained to dexterity and neatness, and covering all with an imperious determination to do the right thing.

Shall I presume to say that some such summary as this defines the model pharmacist of to-day? I think I may; and, if the definition be fair, then I presume further to assert that he stands the type of a high order of being, and that the sphere of life that provides such a part in the present certainly need not offer a very dreary future.

I think moreover I can detect glimpses of a process by which fit actors may be trained to fill this part with credit. Amongst the points of this process I note the care with which the future pharmacist was selected and his qualifications tested before admission as a pupil, the patience with which his interest in the daily work was watched and fostered, the discretion that marked the gradual infliction of responsibility upon his forming character, the judgment that regulated his introduction to the sciences and encouraged his cultivation of their mysteries until they become to him a joy, the final trust and confidence that made him the depositary of experiences only to be revealed to the initiated, and more or less each and all of these points appear to me of value. But I see that the key of the whole process lay in this, that the man was possessed by a high idea of the duties of his calling, to which every other consideration connected with it was made to bend: he was jealous of those duties as of a daughter's honour, and could not consign them to one that was unworthy. He felt his art to be a living thing, with a past, a present, and a future, and though he laboured in it, and lived by it, he refused to regard it as a possession of his own, but only as a trust to be held in common with others for a time, and be transmitted to his successors, if it might be possible, in augmented value. Verily I think this man had his reward. The inheritance committed to his charge he faithfully passed on to hands he had helped to make worthy, and the

"future of pharmacy" must, I think, to his eyes have appeared fair and bright.

I forbear to dwell upon the reverse of this picture, though truth compels me to admit that such, alas, may be found; and I feel, therefore, forbidden to interpret as hopefully as I should wish the tenour of the "shadow of things to come" which these considerations have raised.

But I may perhaps venture to say that the gleam of light that casts these shadows bears with it, as, I think, a message of high import. I read it thus:—The future of our art rests with ourselves. What we strive to make it, that it will become.

It is a message of severest warning; but it is also one of hope. The warning may reach us all alike, but the comfort of the hope will, I think, be felt in proportion to the consciousness of duty well fulfilled.

Had this address been delivered in England, it would have naturally terminated at this point. But I cannot conclude without saying that the assembling of the Pharmaceutical Conference this year in Ireland (let me gratify myself by saying in the "Sister Island") is, I am sure, a great pleasure to its English members.

That strip of sea which for so many purposes serves to unite the two peoples, and to make them one, has acted, alas, upon some of us as a barrier and has kept us apart.

I fear that pharmacy on both sides of the water may have suffered somewhat by this enforced separation. Let us hope that this gathering will tend to the rectification of any such deficiences. At any rate I feel assured that this Dublin meeting will not fail in the great object of the Conference, which is the promotion of scientific pharmacy and the cultivation of feelings of mutual respect and cordiality among those that practise it.

Dr. TICHBORNE proposed a vote of thanks to the President for his eloquent address. His first acquaintance with Mr. Schacht arose through the now well-known preparation Liquor Bismuthi, which was introduced by that gentleman. It was at first quite a curiosity, because it was not then generally known that the bismuth salts were not precipitated by ammonia in the presence of citric acid; so that an alkaline solution of bismuth for internal administration was rather a novelty. He having published an analysis of the preparation, Mr. Schacht some time after claimed his acquaintance on that ground. It was evident from the address that Mr. Schacht was a thoroughly practical man, and that his education had been one of

that typical character which he hoped they would all endeavour to give to their apprentices. One point had been touched on which was perhaps a little dangerous in Ireland. He could hardly say how far the "private notes" referred to would indicate a desire on the part of English pharmacists to trench on medical ground, but happily in Ireland such a thing was unknown. The pharmacist here simply confined himself to his legitimate sphere of duty, and he had no doubt that such was the line of action which the President himself would advocate.

Mr. Pring (Belfast), having seconded the motion, it was put by Mr. Brady (Vice-President), and carried unanimously.

The President, in response, said he feared from Dr. Tichborne's remarks that his quasi autobiographical sketch had been taken to be a personal history, but he wished to say most emphatically that such was not the case. He had simply endeavoured to give a sketch of a typical pharmacist's life.

The reading of papers was then proceeded with.

Fourth Report of the Committee on the Aconite Alkaloids:—C. R. Alder Wright, D.Sc., Lond., J. Williams, F.C.S., and T. B. Groves, F.C.S. The following statement was made on behalf of Messrs. Williams and Groves:—

"The previous reports on the subject have been the joint work of the above Committee, appointed September 4, 1876. The work having developed itself into a research of such a character that it could not well be carried on by a committee, it was relegated by the Committee to the sole care of Dr. Wright, who, with his coadjutor, Mr. Luff, is to be credited with the whole of the work recorded in the annexed report."

FOURTH REPORT ON THE ACONITE ALKALOIDS.

By C. R. Alder Wright, D.Sc., Lond.,

Lecturer on Chemistry; and

A. P. Luff,

Demonstrator of Chemistry in St. Mary's Hospital Medical School.

Since the presentation of the third report last year, a large amount of additional work, chiefly of a purely chemical character, has been accomplished; as this has to a large extent been brought

before the Chemical Society during the last few months, and has either been published in the journal of that Society, or is about to be published therein, it will not be necessary in the present report to take up space by detailing the results of analyses, etc. The principal results arrived at are as follows :—

§ 1. Pseudaconitine.

It has been found that certain salts of pseudaconitine can be obtained in a well crystallized state by special manipulation; thus, if the approximately pure alkaloid, after several crystallizations from alcohol or ether, be rubbed in a mortar with dilute nitric acid till quite dissolved, and a few drops of strong acid be then added and the rubbing continued, the whole quickly becomes a magma of crystallized nitrate, the crystals containing $C_{36}H_{49}NO_{12}$, HNO_3, $3H_2O$. On regenerating the base from the crystals of nitrate purified by recrystallization, a much purer substance is obtained than the bodies heretofore analysed; several specimens of pure base thus prepared yielded numbers leading to the formula $C_{36}H_{49}NO_{12}$, H_2O, the water of crystallization being lost below 100°. The formula previously deduced, $C_{36}H_{49}NO_{11}$, has been found to be somewhat incorrect accordingly; the substances previously examined were, in point of fact, mixtures of pure pseudaconitine $C_{36}H_{49}NO_{12}$ and a base derived therefrom by the removal of the elements of water thus :—

$$C_{36}H_{49}NO_{12} = H_2O + C_{36}H_{47}NO_{11}.$$

To this new derivative we propose to apply the term *apopseudaconitine;* it resembles the parent base very closely in all its properties, and is readily obtained in a pure state by heating pseudaconitine to 100° for some hours, dissolved in a large excess of concentrated tartaric acid solution, or dilute hydrochloric acid. In the latter case a small amount of alteration of a different kind is produced, the pseudaconitine being partially split up into *dimethylprotocatechuic* (or *veratric*)acid and *pseudaconine*, the reactions being indicated by the equations

$$C_{36}H_{49}NO_{12} + H_2O = C_9H_{10}O_4 + C_{27}H_{41}NO_9.$$

With tartaric acid, however, only dehydration to aposeudaconitine takes place. By rendering the final product alkaline with soda, shaking with ether, and spontaneous evaporation of the ethereal solution, more or less pure apopseudaconitine is obtained, easily purified by conversion into crystallized nitrate by stirring with

dilute nitric acid, filter-pumping and washing the crystals, and regenerating the base by means of soda and ether.

The splitting up of pseudaconitine into veratric acid and pseudaconine, shown in the third report to take place when the base is heated with water to 140° in sealed tubes, takes place much more readily on simply boiling for some hours with alcoholic soda, an inverted condenser being attached; perfect conversion thus ensues, although a little of the pseudaconine undergoes a further change and becomes a resinous substance of slightly *acid* characters. The reaction, however, is not indicated by the equation given in last year's report, viz.,—

$$C_{36}H_{49}NO_{11} + H_2O = C_9H_{10}O_4 + C_{27}H_{41}NO_8,$$

but by that given above; the substance regarded last year as pseudaconine and considered to be $C_{27}H_{41}NO_8$ has been found to be really a dehydrated derivative of true pseudaconine, being indicated by the formula $C_{27}H_{39}NO_8$. This substance, which we propose to call *apopseudaconine*, is not formed at all when the reaction takes place at 100° or slightly below, but is readily produced when water at 140° is used as a saponifying agent, its formation being doubtless due to the dehydration of pseudaconitine to apopseudaconitine, and the subsequent saponification of the latter, thus,—

$$C_{36}H_{47}NO_{11} + H_2O = C_9H_{10}O_4 + C_{27}H_{39}NO_8.$$

Pure pseudaconine is readily and completely soluble in water to a strongly alkaline fluid. From ethereal solution it separates as a resinous film on spontaneous evaporation; after standing for a few days the film becomes changed into a mass of crystalline needles; this crystallization, however, does not readily take place with a large mass of base, probably owing to the retention of small quantities of alcohol, ether, etc., preventing the crystallization. Its aqueous solution precipitates silver nitrate, the precipitate being reduced on heating; it does not, however, reduce Fehling's solution, in which respect it differs from aconine.

When pseudaconitine is heated to 100° with a large excess of glacial acetic acid for some hours, it loses the elements of water, the apopseudaconitine first formed being further acted on by the acetic acid forming *acetylapopseudaconitine*, thus,—

$$C_{36}H_{49}NO_{11} + C_2H_3OOH = H_2O + C_{26}H_{46}(C_2H_3O)NO_{11}.$$

Like pseudaconitine and apopseudaconitine, this base crystallizes with H_2O, in which respect the pseudaconitine derivatives all differ

from the analogous aconitine derivatives described below, all of which are anhydrous; it forms a crystallized nitrate and gold salt, and is readily saponified by alkalies, yielding one equivalent of acetic acid and one of veratric (dimethylprotocatechuic) acid. The same acetyl derivative is also formed when pseudaconitine is acted on by acetic anhydride, the reaction being—

$$C_{36}H_{49}NO_{12} + 2(C_2H_3O)_2O = 3C_2H_4O_2 + C_{36}H_{46}(C_2H_3O)NO_{11}.$$

The corresponding *benzoylapopseudaconitine* is produced when benzoic anhydride is substituted for acetic anhydride, thus,—

$$C_{36}H_{49}NO_{12} + 2(C_7H_5O)_2O = 3C_7H_6O_2 + C_{36}H_{46}(C_7H_5O)NO_{11}.$$

Like the other members of the pseudaconitine series, this forms a crystallized nitrate and gold salt; the free base, however, only crystallizes indistinctly from ether.

On heating pseudaconine with benzoic anhydride *dibenzoylapopseudaconine* is formed in virtue of the reaction—

$$C_{27}H_{41}NO_9 + 3(C_7H_5O)_2O = 4C_7H_6O_2 + C_{27}H_{38}(C_7H_5O)_2NO_8.$$

This base does not dissolve readily in water, nor does it crystallize easily; the corresponding *diacetylapopseudaconine* is formed by substituting acetic for benzoic anhydride.

From the mode of formation of these derivatives, the following "structural" formulæ are arrived at—

$$\text{Pseudaconitine } (C_{27}H_{37}NO_5)\begin{cases} OH \\ OH \\ OH \\ OC\,O{\cdot}C_6H_3 \end{cases}\begin{cases} O{\cdot}CH_3 \\ O{\cdot}CH_3 \end{cases} = (X)\begin{cases} OH \\ OH \\ OH \\ O{\cdot}C_9H_9O_3. \end{cases}$$

$$\text{Apopseudaconitine } (C_{27}H_{37}NO_5)\begin{cases} O \\ OH \\ O{\cdot}C\,O{\cdot}C_6H_3(O\,CH_3)_2 \end{cases} = (X)\begin{cases} O \\ OH \\ O{\cdot}C_9H_9O_3. \end{cases}$$

$$\text{Acetyl-apopseudaconitine } (C_{27}H_{37}NO_5)\begin{cases} O \\ O{\cdot}C\,O{\cdot}CH_3 \\ O{\cdot}C\,O{\cdot}C_6H_3(O{\cdot}CH_3)_2 \end{cases} = (X)\begin{cases} O \\ O{\cdot}C_2H_3O \\ O{\cdot}C_9H_9O_3. \end{cases}$$

$$\text{Benzoyl-apopseudaconitine } (C_{27}H_{37}NO_5)\begin{cases} O \\ O{\cdot}C_6H_5 \\ O{\cdot}C\,O{\cdot}C_6H_3(O{\cdot}CH_3)_2 \end{cases} = (X)\begin{cases} O \\ O\,C_7H_5O \\ O{\cdot}C_9H_9O_3. \end{cases}$$

$$\text{Pseudaconine } (C_{27}H_{37}NO_5) \begin{cases} OH \\ OH \\ OH \\ OH \end{cases} = (X) \begin{cases} OH \\ OH \\ OH \\ OH. \end{cases}$$

$$\text{Apopseudaconine } (C_{27}H_{37}NO_5) \begin{cases} O \\ OH \\ OH \end{cases} = (X) \begin{cases} O \\ OH \\ OH. \end{cases}$$

$$\text{Dibenzoyl-apopseudaconine } (C_{27}H_{37}NO_5) \begin{cases} O \\ O{\cdot}C\,O{\cdot}C_6H_5 \\ O{\cdot}C\,O{\cdot}C_6H_5 \end{cases} = (X) \begin{cases} O \\ O{\cdot}C_7H_5O \\ O{\cdot}C_7H_5O. \end{cases}$$

$$\text{Diacetyl-apopseudaconine } (C_{27}H_{37}NO_5) \begin{cases} O \\ O\,C\,O\,CH_3 \\ O{\cdot}C\,O{\cdot}CH_3 \end{cases} = (X) \begin{cases} O \\ O{\cdot}C_2H_3O \\ O{\cdot}C_2H_3O. \end{cases}$$

The drug sold under the name of "aconitine (from *A. Ferox*)" contains, as mentioned in Report III., more or less amorphous bases which do not crystallize or yield crystalline salts. These yield veratric acid on saponification, though to a less extent than pseudaconitine. The amorphous mixture from one batch of rough alkaloidal product obtained from Messrs. Hopkin and Williams yielded on analysis somewhat higher percentages of carbon, hydrogen, and nitrogen than pseudaconitine, from which circumstance, and the diminished yield of veratric acid therefrom, it appears probable that the amorphous substance was a mixture produced by various alterations of pseudaconitine during extraction, by dehydration, polymerization, saponification, etc. Although not inert, this amorphous mass seemed to be considerably less physiologically active than pure pseudaconitine. It appears, therefore, to be most desirable that the mixture of variable composition now usually sold as "aconitine (from *A. Ferox*)" should be discarded, and the pure crystallized base or its nitrate employed instead. As the nitrate is almost insoluble in water containing 8 to 10 per cent. of nitric acid, its preparation and purification is not a matter of any difficulty; it is not necessary that the alkaloid should have been approximately purified by crystallization from ether, alcohol, etc., in order to prepare a well crystallized and almost chemically pure pseudaconitine nitrate. We have succeeded in converting rough alkaloid, containing 25 to 30 per cent. of uncrystallizable bases, into a crystalline magma by simply rubbing in a mortar with dilute nitric acid, and gradually dropping in strong acid with constant rubbing; on draining the magma on a filter-pump, and washing slightly with water

containing 8 to 10 per cent. of nitric acid, an almost pure salt is at once obtained; if required this can readily be purified by dissolving in a minimum of hot water, dropping in strong nitric acid when cool, and vigorously stirring, when almost the whole crystallizes out and is obtained pure by filter-pumping and pressing.

§ 2. Aconitine.

In addition to the results detailed in Report III. (entirely corroborated by the further work done), we have found that the theoretical amount of benzoic acid is obtainable from aconitine by simply boiling for some hours with alcoholic potash or soda, whereas complete saponification with water at 140° in sealed tubes does not take place even after twenty-four hours, although about 85 per cent. of the base is thus decomposed.

Aconitine forms a series of derivatives precisely parallel with those of pseudaconitine above described. When heated to 100° for six to eight hours with a strong solution of tartaric acid it becomes dehydrated, forming *apoaconitine*, thus,—

$$C_{33}H_{43}NO_{12} = H_2O + C_{33}H_{41}NO_{11}.$$

The same result is brought about by dilute mineral acids, only in this case a considerable amount of saponification takes place as a second reaction. In consequence of this ready dehydration it is difficult to isolate aconitine from *A. Napellus* roots, as the crystallized base is apt to be mixed with apoaconitine, which closely resembles the parent alkaloid. Hence many samples of aconitine, analysed as described in former reports, gave numbers not quite accordant with the formula $C_{33}H_{43}NO_{12}$, but agreeing well with a mixture of aconitine, $C_{33}H_{43}NO_{12}$, and apoaconitine, $C_{33}H_{41}NO_{11}$. The hydrobromide of apoaconitine, however, appears to be more soluble in water than that of aconitine, so that by converting the mixture of bases into hydrobromides, as described in Report II., crystallizing and regenerating the alkaloid from the crystals, pure aconitine is obtained, the apoaconitine remaining in the mother liquors.

On treatment with organic anhydrides, aconitine is affected in just the same way as pseudaconitine: thus acetic anhydride forms *acetylapoaconitine* in virtue of the reaction—

$$C_{33}H_{43}NO_{12} + 2(C_2H_3O)_2O = 3C_2H_4O_2 + C_{43}H_{40}(C_2H_3O)NO_{11}$$

whilst benzoic anhydride similarly forms *benzoylapoaconitine*,—

$$C_{33}H_{43}NO_{12} + 2(C_7H_5O)_2O = 3C_7H_6O_2 + C_{33}H_{40}(C_7H_5O)NO_{11}.$$

These bases in most respects resemble the corresponding pseudaconitine derivatives.

On treating aconine with benzoic anhydride it forms *dibenzoylapoaconine*, apparently identical with benzoylapoaconitine from aconitine; heating with dilute mineral acids converts aconine into *apoaconine*, thus—

$$C_{26}H_{39}NO_{11} = H_2O + C_{26}H_{37}NO_{10}.$$

From these data the following "structural" formulæ are arrived at—

Aconitine ($C_{26}H_{25}NO_7$) $\begin{cases} OH \\ OH \\ OH \\ O\cdot C_7H_5O \end{cases}$ $= (Y)\begin{cases} OH \\ OH \\ OH \\ O\cdot C_7H_5O. \end{cases}$

Apoaconitine ($C_{26}H_{35}NO_7$) $\begin{cases} O \\ OH \\ O\cdot C_7H_5O \end{cases}$ $= (Y)\begin{cases} O \\ OH \\ O\cdot C_7H_5O. \end{cases}$

Acetyl apoaconitine ($C_{26}H_{35}NO_7$) $\begin{cases} O \\ O\cdot C_2H_3O \\ O\cdot C_7H_5O \end{cases}$ $= (Y)\begin{cases} O \\ O\cdot C_2H_3O \\ O\cdot C_7H_5O. \end{cases}$

Benzoyl apoaconitine, or dibenzoyl apoaconine ($C_{26}H_{35}NO_7$) $\begin{cases} O \\ O\cdot C_7H_5O \\ O\cdot C_7H_5O \end{cases}$ $= (Y)\begin{cases} O \\ O\cdot C_7H_5O \\ O\cdot C_7H_5O. \end{cases}$

Aconine ($C_{26}H_{35}NO_7$) $\begin{cases} OH \\ OH \\ OH \\ OH \end{cases}$ $= (Y)\begin{cases} OH \\ OH \\ OH \\ OH \end{cases}$

Apoaconine ($C_{26}H_{35}NO_7$) $\begin{cases} O \\ OH \\ OH \end{cases}$ $= (Y)\begin{cases} O \\ OH \\ OH. \end{cases}$

The remarks made in the previous section as to the great desirability of the substitution in the drug trade and for medicinal purposes of the definite pure aconite alkaloids for the amorphous variable mixtures at present in the market apply with as great force to aconitine as to pseudaconitine. Aconitine is so readily crystallizable from ether that the preparation of the base free from amorphous alkaloids is a matter of great ease; or the process of conversion into crystallized nitrate so as to separate non-crystalline bases might be equally well adopted. So far as we are able to judge

apopseudaconitine and apoaconitine are not inferior in activity to the parent bases, so that there would be no necessity to separate the "apo" derivatives, should they be present, crystallizing out with the parent alkaloids. As mentioned in former reports, the use of tartaric acid instead of sulphuric acid to acidulate the alcohol used in percolating is likely to cause an increased yield of pure crystallized alkaloids, the vegetable acid causing no saponification on continued heating with aconitine, whilst dilute mineral acids rapidly bring about more or less saponification and consequent loss of crystallizable base.

§ 3. Alkaloids from Japanese Aconite Roots.

At the last meeting of the Conference Dr. Paul and Mr. Kingzett read a paper on this subject, in which they stated that they had isolated from a batch of these roots a crystallizable alkaloid which did not form crystallizable salts, and which gave the following numbers on analysis, from which the identity of their product with pseudaconitine seemed, as pointed out by one of us during the discussion of the paper, to be highly probable :—

Calculated for Pseudaconitine $C_{36}H_{49}NO_{12}$.		Found (Paul and Kingzett).	
Carbon	62·88	62·926	
Hydrogen	7·13	7·726	7·900
Nitrogen	2·04	2·567 (by volume),	

for nitrogen determinations by volume are usually somewhat in excess of the truth, whilst at the time of their experiments being made it was not known that pseudaconitine formed crystallized salts. The authors, however, assigned to their product the formula,—

$$C_{29}H_{43}NO_9,$$

requiring carbon, 63·38; hydrogen, 7·83; nitrogen, 2·55; notwithstanding that this formula requires slightly more hydrogen than that found as the mean of their analyses, and perceptibly more than that found as the lower value, whilst they wholly neglected to confirm the molecular weight deduced from the nitrogen determination by the analysis of a gold salt or other derivative, such as the hydrochloride or hydrobromide.

We have examined the alkaloids extracted from more than one different batch of roots imported from Japan; whilst our results are as yet incomplete, so that we refrain from details, we have got clear evidence that the crystallizable active alkaloid from different batches

of roots is in each case the same body, and that it is different from both aconitine and pseudaconitine. We are doubtful, however, whether the base that we have isolated is the same as that partially examined by Paul and Kingzett, inasmuch as it readily forms well crystallized salts, especially the nitrate, hydrochloride, and hydrobromide. The numbers obtained by us lead to a formula considerably different from that assigned on such insufficient grounds by Paul and Kingzett, and lying close to that of aconitine. Moreover, like aconitine, the base from the Japanese roots forms one equivalent of benzoic acid on saponification together with a complementary product closely resembling aconine. Whilst in analytical numbers and general chemical and physical properties the new base is closely connected with aconitine, it differs therefrom in one very remarkable particular, viz., that whilst by the action of benzoic anhydride in excess aconitine and its decomposition product, aconine, form each the same *dibenzoylated* derivative, the base from the Japanese roots and its saponification product form by similar treatment a *tetrabenzoylated* derivative, apparently the same whichever base be benzoylated.

Mr. Groves (Weymouth) said the amount of labour performed by Dr. Wright, in the earlier part of which Mr. Williams and himself had assisted, was enormous, and it was very satisfactory to find that they were at last touching solid ground, and that Dr. Wright's results were likely to lead to the very practical consequence that they would be able to furnish the medical profession with crystallizable salts of the aconite series of a definite chemical character and equally definite physiological action. Up to the present time the use of aconite in any form had been almost impossible, because no two samples of the aconite root were equal or even similar in effect; whilst the salts or preparations called aconitine varied almost as much, some being almost inert and others of very great activity. The differences he hoped would soon be at an end, and it was a great satisfaction to think that the action of the Conference had been instrumental in producing so desirable a result. There was of course, still much to be done. The Japanese roots seemed to open quite a new field for investigation, which he hoped would be worked as exhaustively as this had been. He was proud of having been the coadjutor of Dr. Wright in the beginning of his researches, but must disclaim any share in the able paper which had just been read.

Mr. Williams said Dr. Wright had most justly pointed out that

it was highly desirable that medical men should have supplied to them, if possible, pure aconitine, not the mixture frequently sold as commercial aconitine. He would remind the Conference that the article Dr. Wright had referred to as having been supplied to him for experiment was the simple crude alkaloid derived from the aconite root, and did not profess to be purified. He quite agreed in the importance of aconitine being purified, and of a definite pure article being always used, but it was after all a question of cost. Competition had so brought down the price of the ordinary commercial aconitine, that it could only be made in a simple and somewhat crude manner. It was pretty well known that a much purer article could be supplied, but the cost was very much greater, one reason being, as was admitted by Dr. Wright, that a great deal of that which was lost in the process of purification was as active medicinally as that which remained. That was the only objection he saw to the process, and possibly it might in some respects be modified so as to be more suitable to the production of commercial aconitine, without so increasing the price as to place it almost beyond the reach of ordinary medical practice.

Mr. Long (London) said Mr. Williams had rather anticipated him on the matter, particularly with regard to the question of cost. At the same time he thought it was time pharmacists took a more manly tone and insisted on having the best articles and making their customers pay a fair price for them. After all, the cost of a chemist's wares was very small compared to what were called medical comforts.

Dr. Paul asked if any specimens of the definite substances and of the crystallizable salts mentioned in the reports had been forwarded for exhibition.

Professor Attfield said no specimens had been sent.

Dr. Paul wished to call attention to the fact that on the last occasion the Committee appointed to investigate this subject brought forward a report in which it was stated that the alkaloids of aconite had a certain chemical composition and certain relations which appeared very interesting. He would take, for example, the alkaloid to which Dr. Wright had given the name of pseudaconitine. The formula then given to it was $C_{36}H_{49}NO_{11}$, and it was described as being crystallizable but furnishing uncrystallizable salts. It was described as remarkably prone to change in common with most of the basic products known under the name of aconite alkaloids; when heated with dilute mineral acids it was represented as giving rise to another base which had this composition—$C_{27}H_{41}NO_8$; and

this change was represented as consisting in what was termed saponification, *i.e.*, H_2O was added and the base then separated into pseudaconine and dimethylprotocatechuic acid, the composition of which was $C_9H_{10}O_4$. Now in the present paper they were told that the substance then examined and called pseudaconine was now found to be really another substance altogether, and that it was the product of another alteration of pseudaconitine. This product was now called apopseudaconitine, and described as having the composition $C_{27}H_{39}NO_8$. There were some other considerations he might have referred to if time permitted, but this instance was enough, he thought, to show that the conclusions brought forward in these reports must be received with a considerable amount of caution. As a general rule, when chemical results were called in question, the revolutionary movement came from outside; but in this case Dr. Wright and Mr. Luff were their own iconoclasts, for the real purport of this report was to state that the results given in the report of last year were not correct, and to supply a rectification of them. On the basis alone of such results as these, however, a column of elaborate structural formulæ had been built up, which he ventured to say had no sufficient foundation in the facts which had been brought forward. Passing on to the alkaloid of the Japanese aconite, that was described by Mr. Kingzett and himself last year, and submitted to the Conference chiefly with the object of showing that the alkaloid obtained from that root was different from that obtained either from *A. Napellus* or *A. Ferox*, he would recall to their minds that Dr. Wright in speaking on the subject did not hesitate to say that, judging from his own experience, the alkaloid they had prepared and described was really nothing but a mixture of some indefinite substance with some other equally indefinite decomposition product, and that he had frequently obtained in the course of his experiments the same product as they had experimented on. Now there were sufficient data given in the two papers then read to show that there was no ground for that statement, but he now saw some reason for the positive way in which Dr. Wright spoke of the possibility of getting mixtures of compounds. That appeared now by his own showing to have been the result of Dr. Wright's experience. So far as the present report went, he now stated that the data upon which he based his opinion last year did not relate to an individual substance, but really to an indefinite mixture of at least two substances. And in the remarks Dr. Wright now made on the Japanese aconite he only repeated in exactly the same words the conclusion which Mr. Kingzett and

himself submitted last year, viz., that the alkaloid of Japanese aconite was different both from aconitine and from pseudaconitine. Unfortunately his time was so much occupied with other necessary work that he had very little left to devote to investigations of the kind dealt with in these reports, but their importance in various relations was such that one should be grateful for their being carried out by others who had more leisure, but individually he should have been better pleased if the experiments described in the report had been so far right as to place before the Conference a definite account of the characters and chemical relations of the aconite alkaloids. That they had not done so was sufficiently evident when this year's report was compared with that of last year, and consequently the general impression produced was one of distrust. Therefore he again repeated, that these conclusions, generally, ought in his opinion to be received with very great caution, and they required to be supported by considerably weightier evidence than any they at present possessed.

Professor ATTFIELD regretted that Dr. Wright was not present to answer the remarks of Dr. Paul. He would not attempt to do so, but would draw attention to the fact that the substances which Dr. Wright obtained last year, as he stated himself, were not quite pure; but having still further purified them, he now gave the analysis of the purified article. In his opinion Dr. Wright deserved credit, not discredit, for having done so. At the same time he was inclined to think that Dr. Wright would admit that even now the formulæ he had offered for these purified substances might in some future year turn out to be not quite correct. The results were given last year as far as he could go, and if the Conference enabled him to continue his researches, he would no doubt again have to supplement, perhaps correct, his present results. No chemist would be surprised if such proved to be the case, but would be only grateful to Dr. Wright for having honestly guided them.

Mr. T. B. GROVES remarked that the whole of these rectifications of the formulæ of pseudaconitine and its decomposition products were based on the accidental discovery of a mode of crystallizing the nitrate of pseudaconitine.

The PRESIDENT in moving a vote of thanks to Dr. Wright, said there was no doubt they were approaching solid ground on this important matter, and he thought the general desire would be that this matter should be further pursued, and he hoped the Executive Committee would be able to make a further grant for that purpose.

The next paper read was a—

REPORT ON BRUCIA AND THE CONSTITUENTS OF STRYCHNOS BARK.

By W. A. Shenstone, F.I.C.

I have to report, as a grantee of the Conference, that papers on these subjects have been read at evening meetings of the Pharmaceutical Society in January and December, 1877, in which details were given of the results enumerated below.

1. After many experiments it was found that the yield of strychnia obtained by acting on brucia with nitric acid steadily decreases as additional processes of purification are employed, till finally it completely disappears, thus confirming the results arrived at by Mr. Cownley; and subsequent work has satisfied me that an application of Sonnenschein's process may be made a fairly delicate test for the presence of strychnia in brucia.

2. Several specimens of commercial brucia have been examined. All contained strychnia: the proportion varying from 1·05 to ·25 per cent., which, regarding the activity of the impurity, may be considered as an important quantity.

I have proposed a method of purifying brucia, which depends on the power of strychnia to decompose salts of the former alkaloid. It consists in crystallizing the brucia from boiling water to which some acetic acid has been added (as the residual brucia may be easily recovered, I add enough acid to neutralize half the brucia), then washing, draining, and drying the crystals, this operation being repeated if necessary. I find that labour and waste are avoided by stirring the dry brucia with a little water and the acid, and adding them gradually with agitation to the boiling water; this plan prevents the formation of masses of a white solid, difficult of solution, said by Schützenberger to be a variety of igasurine, but which I believe to be wholly or partly dehydrated brucia, though I have not yet made any analysis of the substance.

The statements in the handbooks regarding the solubility of brucia in boiling water are somewhat divergent; I have found that in "Pharmacographia" to be most accurate.

3. An examination of false Angostura bark has shown that this bark does contain strychnia; the rather small quantity present being probably the reason that its presence was overlooked by Pelletier and Caventou.

4. Brucia yields decomposition products to the action of weak

acid, weak alkali and water. These bodies promise to be chiefly of chemical interest, and I am at present engaged upon them, aided, I am happy to say, by a grant from the Chemical Research Fund, as I have been in the above work by the grant kindly afforded to me by the Conference.

On the motion of the PRESIDENT, a vote of thanks was given to Mr. Shenstone for his researches.

The next paper read was on—

THE VOLUMETRIC ESTIMATION OF SOME IRON COMPOUNDS OF THE PHARMACOPŒIA.

BY HARRY NAPIER DRAPER, F.C.S., M.R.I.A.

The paper which I present to the Conference is scarcely worthy of the name. It is somewhat of a note, but much more of a query, and is the result of a doubt which was a few weeks since expressed to me by Professor Tichborne as to the correctness of the figures given by the Pharmacopœia in the volumetric estimation of arseniate of iron. Professor Tichborne thought the quantity of bichromate solution stated as necessary for the conversion of two grams of ferrous arseniate far too small to effect that object, and this led to my making some experiments not only with the arseniate but also with the phosphate and the magnetic oxide.

These are, from the short time at my disposal, somewhat incomplete, but I bring them forward in the hope that some member who has worked at the subject may be able to explain the discrepancies which have presented themselves to me.

The Pharmacopœia volumetric solution of potassium bichromate is, as is well-known, viginti-normal, that is, it contains in a litre 14·75 grams of the salt. And, as correctly stated by the Pharmacopœia, 100 c.c. are capable of converting from the state of proto- to that of persalt 1·68 grams of iron. This statement is obviously in accordance with the equation—

$$6\ Fe\ O + Cr_2\ O_6 = 3\ Fe_2\ O_3 + Cr_2\ O_3.$$

Thus 0·168 grams of pure iron would require 10 c.c. of volumetric solution, and in actual practice the mean of three carefully conducted experiments made with piano wire was found to be 9·7 c.c.

Ferrous Arseniate was the first compound experimented upon. Its composition is given by the Pharmacopœia as $Fe_3\ As_2\ O_8$ "partially

oxidized," and it is stated that two grams require 17 c.c. of the volumetric solution of bichromate. Now if it were possible to prepare the arseniate so that it should not be "partially oxidized," but that all its iron was in the ferrous condition, it would be oxidized by the bichromate as represented by the equation—

$$2\,Fe_3\,As_2\,O_8 + Cr_2\,O_6 = 3\,Fe_2\,O_3 + 2\,As\,O_5 + Cr_2\,O_3,$$

which gives 892 grams of the arseniate as requiring 295 grams of bichromate. Therefore $\frac{1}{100}$th of this quantity (8·92 grams) will require 2·95 grams, that is 200 c.c. of volumetric solution, and necessarily the two grams of the B. P. 44·84 c.c.

But the Pharmacopœia says that two grams require but 17 c.c., and if this be correct the arseniate as prepared by its instructions can contain but 37·9 per cent. of absolute ferrous arseniate. This represents a constitution which is certainly but inadequately expressed by the phrase, "partially oxidized."

Nor does experiment make the matter clearer. Ferrous arseniate was prepared in strict accordance with the instructions of the Pharmacopœia, and three separate quantities of two grams gave the following results:—

Two grams of arseniate required—

(*a*) 10·8 c.c. volumetric bichromate.
(*b*) 10·7 ,, ,, ,,
(*c*) 10·7 ,, ,, ,,

Giving a mean of 10·73 c.c., and representing but 21·7 per cent. of ferrous arseniate.

It is thus apparent that while the Pharmacopœia estimate of the percentage of ferrous arseniate in its preparation falls far short of what theory may reasonably demand, an actual experiment carefully made, falls short even of this.

According to Gmelin, ferrous arseniate contains six atoms of water, but no notice of this is taken by the Pharmacopœia.

The specimen of arseniate prepared by myself contained as stated 21·7 per cent. of $Fe_3\,As_2\,O_8$. I have, however, examined four other specimens purchased in Dublin, with the following results:—

(*a*) Two grams required 3·0 c.c. = 6·64 per cent.
(*b*) ,, ,, 1·5 ,, = 3·34 ,,
(*c*) ,, ,, 2·3 ,, = 5·2 ,,
(*d*) ,, ,, 6·0 ,, = 13·6 ,,

An attempt made to diminish the oxidation by using hot solutions, washing rapidly with hot water, and drying at 212° instead

of at 100°, was unsuccessful, the product in this case containing only 21·1 per cent. of actual ferrous arseniate.

Ferrous Phosphate.—The reaction of this compound with the bichromate is obviously similar to that of the arseniate—

$$2\ Fe_3\ P_2\ O_8 + Cr_2\ O_6 = 3\ Fe_2\ O_3 + 2\ P_2\ O_5 + Cr_2\ O_3,$$

and two grams will require 55·8 c.c. But the Pharmacopœia demands only 25 c.c., that is a degree of purity corresponding to 44·8 per cent. of actual ferrous phosphate.

In this case experiment gave results directly opposed to those obtained in that of the arseniate, for instead of not being able to attain to the Pharmacopœia standard, a specimen of phosphate prepared according to its instructions required 34 c.c., so that it contained 60·9 per cent. of real phosphate against the 44·8 per cent. of the Pharmacopœia.

Four purchased specimens gave the following results:—

(*a*)	Two grams required	17·5 c.c.	=	31·3	per cent.
(*b*)	,, ,,	27·5 ,,	=	49·2	,,
(*c*)	,, ,,	13·5 ,,	=	24·1	,,
(*d*)	,, ,,	16·0 ,,	=	29·6	,,

It would seem that here again the expression "partially oxidized" but very imperfectly signifies a degree of oxidation which is stated by Wittstein to vary between one atom in nine of persalt to one atom in four, and which from the experiments now detailed may possibly exceed this latter proportion. Both Gmelin and Wittstein, it must be observed, agree in assigning to the phosphate eight atoms of water.

Magnetic Oxide.—The results obtained with this compound have been still more unexpected. If it were absolute ferroso-ferric oxide, having the formula assigned to it by the Pharmacopœia, two grams would require according to the equation—

$$6\ Fe_3\ O_4 + Cr_2\ O_6 = 9\ Fe_2\ O_3 + Cr_2\ O_3,$$

28·7 c.c. of volumetric solution. But the Pharmacopœia, though admitting the presence of 20 per cent. of water of hydration and "some peroxide of iron," requires only that two grams shall be oxidized by 8·3 c.c., which would indicate but 28 8 per cent. of magnetic oxide, and a specimen prepared according to its direction has not even reached this standard, requiring only 5·6 c.c. of bichromate.

Professor TICHBORNE asked if Mr. Draper had calculated the actual percentage of arsenic represented by the variation he had noticed. It struck him that this was an important point in connection with the dose of an article like arseniate of iron.

Professor ATTFIELD said he had himself never regarded the number of c.c. of volumetric solution of red chromate required by a given weight of either phosphate or arseniate of iron as indicating the percentage which the compilers of the Pharmacopœia expected these articles to possess. He had always considered that the figures given only showed what was the composition of the particular sample analysed by the compiler, and had looked to the text generally for the standard of purity of these two substances. The two words which expressed the degree of purity, viz., "partially oxidized," he regarded as being extremely vague, and as therefore most properly showing the very vague character of the strength of these two substances when made in conformity with the Pharmacopœia.

Dr. SYMES said he had always contended that if the process given in the Pharmacopœia would not yield a salt of absolute purity, it ought to give one which would bear the test there given; but according to Mr. Draper this was not so, and the results did not correspond with the test given. On a previous occasion he had pointed out that the addition of a little sugar to the water in which the ferrous salts were precipitated assisted in preventing peroxidation, and this fact might have an interest in connection with the present paper.

Mr. WILLIAMS said it had been well known for a long time that the salts mentioned by Mr. Draper were very liable indeed to vary in their composition. With regard to phosphate of iron, it was the practice of the makers to rather encourage oxidation, because their customers much preferred a nice looking blue phosphate of iron to a slate-coloured grey article, and the blue colour could only be obtained by allowing a little more oxidation to take place. It was fortunate, however, that the use of the dry phosphate of iron was now hardly necessary, and probably it would be struck out of future editions of the Pharmacopœia. Phosphate of iron was now mainly used in the form of syrup and in solutions, and in that form it was used before it had time to oxidize; in fact, the fresher it was the better. Arseniate of iron was so very little used that there had not, perhaps, been so much attention paid to it as might have been desired; but phosphates and arseniates were so analogous that it might be expected the results would be very similar. As for the

magnetic oxide, he could quite endorse what Mr. Draper said, that it was most liable to vary in its composition and very difficult to keep in a perfect condition; it was almost certain to have a considerable quantity of peroxide mixed with it.

Mr. DRAPER in reply said he had not made any calculation of the quantity of arsenic present. The arseniate of iron was rather an arsenic than an iron preparation, and he did not think it important whether the salt were in the ferrous or ferric condition; of that, however, he was not sure, not having directed his attention to that subject. He would add that the whole gist of his paper was to show that the Pharmacopœia gave a process for the preparation of the arseniate which would not come up to the standard it laid down and could not be made to do so. With the phosphates the case was exactly the reverse, the process furnishing a product which gave a far higher percentage than was required. He thanked Dr. Symes for his observations with regard to sugar, and he had seen it observed that in examining saccharated carbonate of iron more bichromate of potassium was required than if there were no sugar present. He might inform Mr. Williams that he had seen the Pharmacopœia process strictly carried out, and a very good phosphate obtained of a nice blue colour.

On the motion of the PRESIDENT the thanks of the Conference were accorded to Mr. Draper.

The next paper read was on—

NITRITE OF AMYL.

By D. B. DOTT.

Nitrite of amyl is now admitted to be an important remedial agent, having taken its place in the national Pharmacopœia. Being a substance of great physiological activity, it is highly important that it should be obtained pure; or if that is impracticable, that the preparation should be of constant strength. With the view of ascertaining whether either of these conditions holds good with the article in the market, I procured several samples from such sources that they may be regarded as fairly representative, and submitted them to examination along with a quantity (*a*) prepared by ourselves. As there is considerable divergence in the boiling point of amylic nitrite as given by different authorities, the fraction 90°–100° C. was collected as correct. This portion had invariably the

proper sp. gr. of ·877. The results of the examination are embodied in the table annexed.

Sample.	A	B	C	D	E	F
Specific Gravity.	·877	·876	·864	·875	·875	·875
Below 90° . . .	5·0	3·0	34·6	2·6	0·0	52·0
90°–100°	85·0	65·0	6·7	47·5	11·5	33·3
Above 100° . . .	8·0	28·0	51·7	45·7	83·9	11·4
Water	0·0	0·0	1·8	0·0	2·2	0·0
Loss	2·0	4·0	5 2	4·2	2·4	3·3
	100·0	100·0	100·0	100·0	100·0	100·0

These figures give the results of a single rectification. Of course, on again rectifying the lower and higher fractions an additional quantity of nitrite of amyl would be obtained; but the numbers are sufficient for the purpose of comparison. The samples C and E are of very poor quality, E being probably the inferior, because although it apparently contains a larger percentage of amylic nitrite than C, it yields a large proportion boiling above 100°, the temperature rising to 230° before the distillation was stopped, leaving a black oily residue in the flask. The odour of this sample was quite different from that of genuine nitrite of amyl. It will thus be seen that out of five specimens examined, two were of very inferior quality. That it is difficult completely to separate the nitrite of amyl by rectification from the accompanying substances, is shown by the numbers here given. The fractions boiling below 90° and above 100° from the sample F were rectified together in the same way as before, the process being repeated twice.

I. 59·0 c.c. gave 13·0 c.c. = 22·0 per cent 90°–100°.
II. 43·0 ,, ,, 8·0 ,, = 18·6 ,, ,, ,,
III. 33·5 ,, ,, 5·0 ,, = 14·9 ,, ,, ,,

In passing judgment, however, on such a substance as nitrite of amyl, the question meets us at the very outset, What degree of purity have we a right to expect in this body? In the case of amylic nitrite the question is one of considerable difficulty, requiring for its elucidation the consideration of a number of facts. In the first place, I have ascertained that the fractions boiling below 90° and above 100° are for the most part either physiologically inert or have an action distinct from that of nitrite of amyl. There may, however, be several isomeric or metameric nitrites, whose boiling

points differ and yet whose physiological action is the same. That this is the case seems probable from the varying boiling points given for amylic nitrite and amylic alcohol. Indeed two isomeric alcohols are known to exist. According to the authorities cited in Watt's "Dictionary," the boiling point of the nitrite varies from 91° to 96°. Tanner (*Year-Book of Pharmacy*, 1872, 186), gives 95°–100°, and Umney (*Pharmaceutical Journal*, 3rd series, i., 422) 98°–100°, as the temperatures at which nitrite of amyl should distil. For amylic alcohol Gmelin gives boiling points varying from 127° to 134°, and even the more recent researches record apparently conflicting accounts. Schorlemmer found ("Proceedings of the Royal Society," xv., 131) that amyl alcohol whether prepared from fusel oil or from American petroleum, boiled at 132°. On the other hand, Pedler (*Chemical Society's Journal* [2], vi., 74) gives 128° and 129° as the boiling points of the dextrogyrate and optically inactive alcohols, respectively. Without going further into the matter at present, I may say with certainty that there is an amylic alcohol or mixture of alcohols boiling at 128°–129°. This I have proved by rectifying a fraction repeatedly until it distilled entirely at 128°–129°, and then oxidizing the same with potassic anhydrochromate and sulphuric acid. It gave a yield of valerianic acid equal to 14 per cent. Other matters that have to be taken into account are the possible inapplicability on the large scale of a process of preparation or purification that may work well in the laboratory, also that a sample honestly prepared by one method may contain impurities not existing in a sample prepared by another process. Not much importance need be attached to the sp. gr., as on account of the lower fractions having a higher, and the higher fractions a lower sp. gr. than amylic nitrite, it is easy by a judicious blending to produce the desired density.

For the preparation of the nitrite, two processes are given in the Pharmacopœia, "by the action of nitric acid or nitrous acid ($N_2 O_3$) on amylic alcohol." Of these two I have no hesitation in pronouncing the latter to be the better. Whether it is the more economical may be open to question. The objection of Hunge, quoted in the *Year-Book of Pharmacy*, 1871, 225, that by this process a black non-volatile substance and a number of other impurities are formed, is unfounded. After passing the gas through for a sufficient length of time, the liquid is agitated with water, decanted therefrom, and shaken up with sodic carbonate. The nitrite is now rectified, the portion passing over between 90° and 100° being retained. The amylic nitrite thus obtained has a sp. gr. of ·877. By repeated

rectification, however, I have never been able to get more than 95 per cent. of distillate. This arises partly from loss in the distillation, but chiefly from decomposition which then occurs, there invariably remaining a residue boiling above 100°. The fact that decomposition does take place is proved by observing that while the liquid before distilling is quite neutral to test paper, the distillate is strongly acid.

The results of one experiment are here given,—

60·0 c.c. gave 52·5 c.c. = 87·5 per cent., boiling at 90°–100°
52·5 ,, ,, 49·5 ,, = 94·2 ,, ,, ,, ,,
49·0 ,, ,, 46·5 ,, = 94·8 ,, ,, ,, ,,
46·5 ,, ,, 44·0 ,, = 94·6 ,, ,, ,, ,,

Considering all the circumstances of the case, it will readily be allowed that the fixing of a standard of purity for nitrite of amyl is, in the present state of our knowledge, a matter of difficulty, and that it must be to a certain extent arbitrary. The British Pharmacopœia describes the liquid in question as boiling at 205° F. or 96° C. I can only say that no sample we have ever examined, whether purchased or prepared by ourselves, boiled constantly at that or any other temperature, nor have I any reason to believe that such a perfect preparation has been produced. It is not, of course, for me to decide what tests medicinal amyl nitrite ought to answer; but I think it will be generally agreed that such products as those marked C and E are not altogether creditable to the profession of pharmacy.

Mr. Umney expressed his regret that nitrite of amyl was not to be found in a purer state now than it was seven years ago, when he went over precisely the same ground as that covered by the present paper. The physiological action of the nitrites of methyl, ethyl, and amyl had been thoroughly worked out by Dr. Richardson. He believed that the *sine quâ non* in the manufacture of pure nitrite of amyl was true amylic alcohol, to start with, not ordinary fusel oil.

Professor Tichborne was very glad to find that Mr. Dott had confirmed a fact which he noticed many years ago in a work called "The Laboratory," and which was afterwards denied by Mr. Chapman, one of the best authorities on nitrites. He then pointed out that nitrite of amyl was dissociated in the act of boiling into amyl oxide and nitrous oxide gas; this was denied, as he had stated, by Mr. Chapman, and he was glad to find that recent experiments confirmed the observations.

Mr. T. B. Groves asked if Professor Tichborne had tried distillation *in vacuo* or in carbonic acid, so as to be out of contact with air.

Professor Tichborne said that at the time he performed the experiment he tried carbonic acid, and that had no effect; but he was not prepared to say what would be the result of distillation *in vacuo*. He fancied that the dissociation of the molecules was really a matter of temperature, and as distillation *in vacuo* could be carried on at a much lower temperature, that dissociation might be brought to *nil* or next door to it.

A vote of thanks was passed to Mr. Dott.

The Conference then adjourned for luncheon, which was provided in an adjoining room by the Local Committee.

Upon reassembling the Secretary read a paper entitled—

FRAGMENTARY NOTES ON OPIUM.

By B. S. Proctor.

Called upon by your worthy Secretary to contribute a paper to this meeting of the Conference, I venture to return to the subject of my recent communications, namely, opium. On this I propose to make one or two short observations, which I trust may not be without interest to practical pharmacists.

Crude Drug.—Excluding exceptional specimens, commercial Turkey opium varies in its strength from 4 per cent. to 12 per cent. of morphia. The importance of standardizing is too obvious to require enforcement. No one could prudently use his opium from either extremity of this scale, and the science of therapeutics can never progress satisfactorily while its agents remain of this uncertain force. It is the duty of pharmacy to supply instruments of precision with which the science of medicine can perform its work.

Impurities.—It has been sufficiently pointed out that the appearance of Turkey opium as it occurs in commerce is but little guide to its morphia value, but it is perhaps not sufficiently acknowledged that no hard-and-fast line can be drawn between genuine and adulterated samples. The only satisfactory definition must lie in general characteristics well known as belonging to the common run of samples, together with an official strength as regards morphia, defined between certain narrow limits, which should fix a maximum as well as a minimum. If we attempt to define what opium should be, say the residue obtained by the evaporation of poppy juice, every commercial sample might be regarded as impure, from the presence

of vegetable tissue quite unavoidably there. The smooth extract-like appearance presented by most samples of Persian, and by occasional samples of Turkey and Egyptian opium, should be the rule and not the exception if opium were pure evaporated poppy juice. Nor are we any nearer to a satisfactory definition of genuineness if we say that it should contain no tissue or foreign matter but what is unavoidably present, for the adhering leaf and chaff, which are common and convenient, are not unavoidable, and yet could not be reasonably objected to. On the other hand, the descriptions of the collecting and manufacture of opium tells us of fruit pulps and gum being worked up with the scraps, and made into presentable looking lumps. These additions we would without hesitation declare to be adulterations, though the official standard of strength might readily pass some specimens so made up if the scraps were rich, and the excipient not used extravagantly. Probably this custom of "making up" very much influences the character of the opium as regards its tendency to absorb moisture, or to lose it, to become mouldy, etc., though it is not unlikely that these qualities may vary in great degree with the soil, climate, season, or mode of collecting the opium; for I have found rich samples hard and mouldy, and others soft and hygroscopic.

Hygroscopic Quality.—Samples of opium vary very much in their hygroscopic qualities, though all I have examined have considerable affinity for water. Some when exposed to a damp atmosphere absorb water with avidity till they are reduced to the condition of a sticky extract. Others which did not under the same circumstances absorb nearly so much, yet retained the last few percentages of water with obstinacy when heated in the drying closet to 150° F., and I have noticed 100 grains, which had been dried at 212° F., reabsorb three grains of water in a few hours while exposed on the top shelf in my office, where the thermometer stood at 90° F., with the gas burning near it. Constancy in the degree of hydration of the powder, which of course affects constancy in its morphia value, will no doubt be best attained by desiccation being carried only to a moderate degree.

Gummy Samples.—Samples of crude opium, which were by analysis palpably sophisticated and unfit for medical use, have presented appearances varying no less than those of the better qualities. One character, which I have repeatedly observed, is a smooth pillular texture, suggestive of apple or fig pulp, an external covering of a bright green leaf, and a morphia percentage sinking down to the small numbers or to fractions of an unit. All ordinary opiums

when reduced to a syrupy magma with water undergo curdling on the addition of spirit, but in these pulpy specimens the curdling is so great as to cause the separation of a sticky clot of gum or mucilaginous matter. I am told that a green leaf variety is much esteemed by smokers; probably the samples which have come under my notice may have been imitations of this favourite article, for their appearance was such as to lead to hesitation, if not rejection had they been offered to a druggist for pharmaceutical use.

Mouldy Samples.—Mouldy samples have varied from 6 to 12 per cent. Perhaps a want of odorous matter may be characteristic of them; it certainly was so in several cases; and not improbably the odorous principle may have an antiseptic action upon some of the constituents of the drug. From the richness of some of these samples it would not appear likely that the moulding has any injurious action upon the morphia. This supposition is further supported by the following observation: In March, 1875, I prepared a solution of opium in water to test the relative merits of sundry modes of analysis, and obtained results varying from 6·6 to 7·0 per cent. of morphia. This solution was beginning to turn mouldy in June, 1876; the stopper was occasionally removed to encourage the moulding to do its worst; and in November, 1877, the analysis was repeated with results closely agreeing with those first obtained, the percentage being between 6·6 and 7·0.

Extract, and Liquid Extract.—Bearing in mind that the Pharmacopœia admits opium varying from 6 per cent. up to the richest found in commerce, it becomes important to consider how far the therapeutic value of the extract and liquid extract corresponds with the value of the crude drug from which they were prepared. Turning to Mulder's analysis as quoted by Pereira, it gives the percentage of morphia in Smyrna opium as varying between 2·8 and 10·8, and the gummy extractive as varying from 21 to 31, but the percentage of morphia has no constant relation to the proportion of gummy extractive. The sample yielding 31 of gummy extractive contained only 4·1 of morphia, while another sample yielding 21 of gummy extractive contained 9·8 of morphia; so that while, of the crude opiums one was little more than twice the strength of the other, the extracts prepared from the same would probably vary in about the proportion of 3 to 1.

Again, turning to the paper by Mr. Dott, presented to our meeting at Glasgow, where he gives particulars of twelve samples of Turkey opium, all within the Pharmacopœia standard,—that is, varying between 6·76 and 12·30 per cent.—the dry extract yielded

by the same varied between 13·7 and 34·4 per cent. of morphia; this exceptionally rich extract being yielded by a poor opium, containing only 6·93 per cent. of morphia. Comparing No. 4 in Mr. Dott's table with No. 10, there is a difference in morphia value of the crude drugs amounting to only about 2 per cent., the difference in the extracts from the same is nearly 11 per cent. of morphia. The relation among the samples of commercial extract he examined was, by some happy accident, more satisfactory. I say by accident, as the relation does not correspond, as it naturally should do, with the relation among the samples of liquid extract. In this latter preparation he found the grains of morphia per fluid ounce varied from 1·66 to 4·51, that is omitting one very bad sample, which it is stated yielded only 0·61, but which he seems to admit requires confirmation.

Solid Extract.—These observations point emphatically to the importance of making a change in the formulæ for these two preparations. According to my experience the solid extract is but little used except for the preparation of the liquid, and it might probably be discontinued without much disadvantage; but if it is to be retained, it should be prepared from opium of defined value, and the product should be made up to a definite quantity by the addition, if necessary, of sugar, gum, starch, or other inert matter.

Liquid Extract.—The liquid extract should be made from a standard opium direct, and after the requisite solution, evaporation and resolution to separate the narcotine, resinous matter, etc., the product should be made up to such a quantity that a fluid ounce would contain 3 grains of morphia. This would correspond pretty closely with the average of the liquid extracts of opium as found in use, and very closely with the strength of the official liquors of morphia.*

Analysis, etc.—In a former communication I had occasion to point out the solubility of narcotine in neutral or alkaline solutions of morphia in water; I have now to record an observation of the solubility of morphia in benzine in the presence of a considerable proportion of narcotine. This, however, applies to morphia in its free state and not as it exists in opium. Working upon opium in considerable quantity, as I have had occasion to do in connection with Swan & Proctor's patent for the purification of opium, I have failed to detect any morphia or codeia in the benzine percolates.

* Three grains of morphia being about equal to four grains of the hydrochlorate or acetate.

This would rather confirm the propriety of the order of proceeding in Mr. Cleaver's mode of analysis; the benzine percolation being finished before the addition of lime which accompanies the action of water in the second percolation. The observation also exemplifies the difficulty there is in sharply separating these two alkaloids, and the necessity there is for vigilant circumspection in dealing with samples differing from the common run.

If, however, it be desirable in any case to free a sample of opium entirely from narcotine before treating it for morphia, an observation which I have recorded in the specification of patent, but which it may not be out of place to repeat here, will bear upon the point, namely, that some samples of opium containing excess of acid cannot be freed from their narcotine by treatment with benzine or ether unless the acid be neutralized and the narcotine thus set free. A sample of acid opium in dry powder, suspended in dry ether and dry ammonia passed through it till all was strongly alkaline, yielded up its narcotine readily on subsequently percolating more of the solvent.

Ammonia was not discovered in the latter portions of the percolate, but was freely evolved from the powdered opium during the subsequent drying (or more correctly during the warming to rid it of the absorbed ether, for water had been excluded all the time); and what is equally remarkable the natural morphia salt of opium, presumably the meconate, appeared to have undergone no decomposition, for the morphia was still readily extracted by spirit or water.

Possibly the presence of excess of acid would account for the difficulty experienced by Professor Flückiger in removing narcotine, etc., by ether. See "Pharmacographia," pp. 59–60, and *Pharmaceutical Journal*, April 24, 1875, in which latter article the learned professor speaks of treating opium with boiling ether twenty or thirty times for the extraction of its narcotine, and then does not quote any evidence of the absence of this alkaloid in the opium so treated, nor does he state whether the latter decoctions continued to extract appreciable quantities.

Numerous experiments have shown the power which ether possesses of detracting from the solvent power of spirit or chloroform in relation to the morphia in its state of combination in the opium, the meconate of morphia being nearly insoluble in a mixture of chloroform and ether, slightly more soluble in the same with the addition of spirit, and freely soluble in a mixture of chloroform and spirit without the addition of ether.

No discussion followed the reading of this paper. A vote of thanks was passed to the author.

The next paper was on—

SOLUBLE ESSENCE OF GINGER.

By J. C. Thresh, F.C.S.,
Pharmaceutical Chemist.

Requiring some time ago a strong solution of the active principles of ginger, which would mix with water or syrup without causing turbidity, I was led to make a number of inquiries and experiments, some of the results of which it is the purpose of this paper to communicate.

I found that most wholesale drug houses made and kept in stock a so-called soluble ginger essence, but in many cases the pungency was due to cayenne, and (with one exception) the pleasing aroma of ginger was woefully deficient.

I also obtained several receipts for this essence, but none of them gave satisfactory results. One ordered the powdered root to be precolated with a dilute alcohol, another with a mixture of spirit and glycerin, a third ordered a strong decoction of the ginger to be fortified and preserved by the addition of a weak tincture of cayenne, etc.; but not one of them yielded a result possessing the full flavour and odour of the ginger from which it had been prepared.

I then began to investigate for myself, and ultimately succeeded in making an essence which answered my requirements; but before giving the form for its preparation, allow me to say a few words about the varieties of ginger and of the essence, or rather B.P. strong tinctures, found in the market. On making the soluble essence from the B.P. strong tincture obtained from different houses, I was much struck by the varying qualities (judged by the odour) of the essences made therefrom. Most of the strong tinctures were of a deep red-brown colour, and contained a large percentage of resinous matter in solution, and invariably the darker the tincture the more inferior the essence. These I have no doubt were made with Jamaica ginger of inferior quality, for I find that the cheaper kinds are much richer in resins, whilst they are equally poor with regard to the volatile aromatic principle. In the strong tincture the spirit conceals the aroma; hence it is difficult to compare two specimens by their odour without diluting them. Let them be diluted,

however, and then compare the essence prepared from fine Jamaica ginger and that made from an inferior variety. The difference is so surprising that I have heard an experienced chemist doubt whether the fragrant odour of the former was solely due to the ginger used.

To return to my subject. After finding a method of making the soluble tincture, and trying the effects of varying the proportions of the ingredients, the following form was fixed upon as yielding upon the whole the best results.

Take of finest Jamaica ginger in powder 1 pound; pour upon this 8 ounces of rectified spirit, and after allowing to stand for several hours add more spirit; percolate to 16 ounces. To this add 2 ounces of heavy carbonate of magnesia, agitate and add 24 ounces of water. Shake well and filter. If the filtrate is turbid the whole must be shaken with a little more magnesia and again filtered. The filtrate possesses all the aroma of the ginger, and a fair share of its pungency, and is of a pleasing yellow-brown colour. After keeping a few days it becomes turbid and deposits slightly, but if again filtered appears to continue clear.

The action of the magnesia probably is partly mechanical, partly chemical, for the peculiar tint of the essence is undoubtedly due to the action of the hydrate of magnesia upon the ginger resin, and the precipitate which forms soon after the essence is first made is a compound of resin and magnesia. I had suspected that the resin left in solution differed from that removed, but upon evaporating the soluble essence and examining the resinous residue I could detect no difference between them; moreover, when dissolved in spirit, diluted and shaken with magnesia, most of it was removed from solution, and the magnesia compound resembled that first separated.

I have since found that calcium sulphate, calcium carbonate, and charcoal powder, are equally efficacious in removing the excess of resin, but the resulting solution is in all cases much paler in colour, and probably when charcoal is used the odour may not be so strong. These no doubt act mechanically, causing the aggregation of the resin precipitated by the water; hence it is probable that any fine inert powder will answer as well as the magnesia.

A syrup made by mixing equal quantities of strong simple syrup and soluble essence is very suitable for using with gazogenes, and a weaker syrup might with advantage replace the unsightly preparation of the Pharmacopœia.

The belief that this subject would be of interest to many phar-

macists, and that the results of my imperfect investigation would be of value to others, must be my apology for troubling the Conference with this paper.

Specimens of soluble essence and of syrup made therefrom are upon the table at the service of any member who would like to examine them.

The following note on the same subject was also read:—

SOLUBLE ESSENCE OF GINGER.

By B. S. Proctor.

Commercial samples have no great alcoholic strength.

Essence of ginger made with strong spirit and diluted with water continues milky for a long time.

The same mixed with a little alum or sulphuric acid becomes clear after standing some time (a week or two?). The quantity of alum or acid requisite is not sufficient to impart any taste to the essence produced, and may be got rid of (the acid most completely) by mixing with pure carbonate of lime and filtering. A clear, pungent, aromatic essence is thus produced, which turns slightly opalescent when mixed with water.

Mr. Umney thought that for this paper the Conference, and especially the Irish members, were much indebted to Mr. Thresh, for in no place of an equal population was the manufacture of aerated waters so extensively carried on. A good essence of ginger was still a desideratum. He had for some time been trying to make a good soluble essence. He had made considerable quantities by a process similar to that now indicated, but with the omission of the spirit, using dilute glycerin only. He found that this did not take up the resinous principle, but the essential oil only, and as far as he could judge, such an essence was chiefly a solution of the essential oil. He was glad to find that Mr. Thresh was investigating this matter, as he had previously investigated capsicine very successfully, and he felt sure that if he carried on his experiments much benefit would result. There was no doubt the different varieties of ginger had a great effect on the resulting essence. He had tried all kinds, and had found some specimens of Jamaica ginger so mucilaginous that there was no doing anything with them. This process of exhaustion by spirits of wine and precipitation of resinous matter by

means of some mechanical body, such as carbonate of magnesia, seemed a good one, but he was not prepared to say that the process was wholly mechanical. If crude animal charcoal were used, he presumed it would have some chemical effect.

Mr. SAVAGE said this was one of those practical papers which were always appreciated by the trade. Some time ago a ginger beer maker called upon him, and said that he was in the habit of using essence of ginger, but he always found the beer became opaque. He found the remedy was, instead of using strong spirit, to use it in the proportion now given, two of spirit to three of water. This did not dissolve the resin, and the compound was satisfactory.

Dr. SYMES had found, in examining samples of ginger with regard to their suitability for preparing essence, that a good method was to prepare a small quantity by treating a little of the powder with a small quantity of spirit and adding a few drops of the essence so obtained to a large quantity of water, say ten minims to an ounce of water. The water seemed to have the property of throwing up the flavour and making it apparent, and strong essences of ginger, which while they contained strong spirit, were not readily distinguishable, could in this way be easily distinguished. The deep coloured specimens referred to might have been prepared from African ginger, which was very dark, but not of good flavour. His experience confirmed that of Mr. Savage, that if ginger were treated with dilute spirit in the first instance, the same result was obtained as by dissolving in strong spirit and then precipitating the resin. But percolation was then apt to fail, because there would be a precipitation of a layer of resin on the surface of the marc which prevented the further percolation. Agitation with dilute spirit and lengthened maceration so as to allow the resin to subside appeared to be the most practical and efficient mode of working.

Mr. HATCH thought it probable that the darker fluid had been prepared from African ginger.

Mr. GROVES asked if any one knew the nature of the resin which was rejected by the proof spirit.

Dr. SYMES said he had never examined it.

Mr. GROVES said he should imagine that the essence of ginger as made by Mr. Thresh was not quite so pungent as that made by maceration, which would contain the whole of the resin.

Professor ATTFIELD said it had been affirmed that the flavour of the ginger resided in the oil, and the pungency in the resin. If that were so it would follow that if the resin were removed the pungency would be reduced to a similar extent; but then, as Mr.

Thresh hinted, there might be two resins, one of which was pungent and the other not. He should suggest that Mr. Thresh examine the matter further, for no one was better qualified to carry out an investigation of this kind.

Mr. DRAPER, referring to the remark of Mr. Umney that oil of ginger was quite a different preparation, said essence prepared from it did not give the same results as that obtained from ginger itself. The oil of ginger came from Germany, and was said to be distilled from the ginger root. No varieties were given, but neither essence nor syrup of ginger could be made from it. Why this should be if the whole flavouring resided in the volatile oil, was not quite clear. On the other hand, it did not seem to reside in the resin, because with this formula 16 ounces of tincture were taken and added to 24 ounces of water, therefore necessarily precipitating the whole resin. What was left was certainly of considerable interest to pharmacists to determine. He took rather an exceptional interest in the subject, and should be glad if it were further investigated.

Mr. ABRAHAM said the specimen of syrup furnished seemed to him very deficient in aroma although not in pungency.

Mr. SUMNER said there was room for a great deal more research with regard to extracting the properties of ginger. One of his sons had given a great deal of attention to the subject, and his experience up to the present time had been that the pungency was in the resin, and the aroma in the soft part. Ginger might be classified into two distinct kinds, the soft floury ginger and the resinous, and his son had found that the aroma is in the soft ginger and the pungency in the resinous. With regard to the flavour, no ginger would give the same flavour or anything approaching it as the Jamaica.

The PRESIDENT, in moving a vote of thanks to Mr. Thresh, said it seemed to him that the subject might be divided into two portions. If the object of the investigator was to get a preparation which was perfectly soluble in water, that was one thing; but if it were to produce a mixture which should dissolve all the characteristic properties of the drug and produce them in a fluid form, that was another question altogether, the latter being by far the most interesting, as it came into the category of inquiries which he rather thought in the future would attain more interest than they had up to the present time. Many present would be familiar with some work of Dr. Squibb, in which he had been endeavouring to show that almost every drug should be treated with a different menstruum. That seemed to be the tendency of Dr. Squibb's investigation, and

already some curious results bearing upon it had been brought out. He should be disposed to think the complete analysis of ginger was still to be made. As far as obtaining simply a preparation soluble in water, the problem was not a very difficult one, and Mr. Thresh seemed to have pretty well worked it out.

The next paper read was a—

NOTE ON BEBERIA.

By D. B. Dott.

Beberine was discovered in 1834, by Dr. Rodie, of Demerara, and has since been investigated by several eminent chemists. The formula $C_{19}H_{21}NO_3$ was ascribed to it by Von Planta, but $C_{18}H_{21}NO_3$ was found by Bödeker to be the formula of pelosine, and that alkaloid Flückiger considers to be identical with beberine. Considerable uncertainty, however, has always existed as to whether the alkaloid analysed was perfectly pure, owing to the fact that hitherto no crystalline salt thereof had been obtained.

I have succeeded in preparing a crystalline hydrochloride, from the examination of which I hope to be able to ascertain the composition of the base. This crystalline muriate may be prepared in a variety of ways, amongst others by the process now described. The ammonia precipitate of the British Pharmacopœia process is extracted with ether, the ether distilled off, and the residue dissolved in water with hydrochloric acid. From this solution by fractional precipitation the base is obtained of a greyish white colour. When this is dissolved in excess of dilute hydrochloric acid, and the solution allowed to evaporate at the ordinary temperature, crystals will gradually make their appearance, generally after some days. The solution ought not to be neutral, as in that case it is apt to form a gelatinous mass. The largest crystals I have obtained, however, were from an almost neutral solution. Even with these the form was only discernible under the microscope, when they were seen to consist of very long four-sided prisms. The crystalline magma, formed as above described, should be freed from mother-waters by pressure, and the remaining muriate by recrystallization may be obtained perfectly white. This salt possesses in a marked degree the sweet bitter taste, formerly noticed by Dr. Maclagan. The alkaloid precipitated from it is free from colour and may be assumed to be pure.

The paper gave rise to no discussion. A vote of thanks was passed to Mr. Dott.

The next paper read was on—

THE TITRATION OF HYDROCYANIC ACID AND CYANIDES, AND ITS RELATION TO ALKALIMETRY.

By Louis Siebold.

Liebig's method for estimating the strength of hydrocyanic acid by means of decinormal solution of silver nitrate gives perfectly accurate results if the following precautions be observed :—

1. The solution of sodium or potassium hydrate should be placed in the beaker first, and the hydrocyanic acid added to it from the pipette. If, instead of this, the acid is placed in the beaker first, and the alkaline hydrate added afterwards, there may be a slight loss by evaporation, which becomes appreciable whenever there is any delay in the addition of the alkali.

2. The mixture of hydrocyanic acid and alkali should be largely diluted with water before the silver nitrate is added. The most suitable proportion of water, according to my experience, is from ten to twenty times the volume of the officinal or of Scheele's acid, which is more than twice the quantity recommended by Fresenius and other authorities. With such a degree of dilution the final point of the reaction can be observed with greater precision.

3. The amount of alkali used should be as exactly as possible that required for the conversion of the hydrocyanic acid into alkaline cyanide, as an insufficiency or an excess both affect the accuracy of the result. With an excess the results are too high ; with an insufficient quantity they are too low. The error due to the first named cause is but small, and is pointed out in some of the standard analytical works, which therefore recommend the use of sufficient alkali to produce a distinct alkaline reaction, and the avoidance of an undue excess. But it is just this direction which may lead a conscientious yet inexperienced manipulator to the far more serious mistake of using too little alkali, because litmus entirely fails to mark the point at which the hydrocyanic acid has been completely converted into sodium or potassium cyanide. These cyanides are so strongly alkaline to test paper, and hydrocyanic acid is so weak an acid, that a mixture of the two may have a distinct or even a very strong alkaline reaction, and yet contain a considerable amount

of free hydrocyanic acid. Hence it follows that the use of a quantity of sodium hydrate quite sufficient to produce a strong alkaline reaction may only ensure the conversion of a portion, and perhaps of the smaller portion, of the hydrocyanic acid actually present into sodium cyanide. The inevitable result will be a serious error in the estimation, as the quantity of silver nitrate solution required to produce a permanent precipitate will only indicate that portion of the hydrocyanic acid which has entered into combination with the alkali; and this error may possibly amount to as much as 75 per cent.

I have alluded to this source of error at one of our previous meetings, in connection with a paper on the preservation of hydrocyanic acid, and I pointed out on that occasion that the alkalinity of the mixture at the end of the reaction, *e.g.*, after the addition of sufficient silver nitrate to produce a slight permanent precipitate, may be regarded as a sure indication that a sufficient quantity or rather an excess of alkali has been used, and that the result of the determination will be fairly correct, or in the presence of an undue excess of alkali a little too high. The alkalinity of the mixture of hydrocyanic acid and sodium hydrate completely ceases after the addition of the required amount of silver nitrate, unless some excess of alkali was used, and if it does cease, the result of the analysis will almost certainly be too low. My reason for again touching upon these points is that the neutrality of the double cyanide of sodium and silver (the product of this reaction), on which these conclusions were based, also forms the basis of my present communication.

From what I have already stated it is clear that the titration of hydrocyanic acid with silver nitrate cannot give results of scientific accuracy unless the quantity of alkali used is exactly that required to combine with the acid, or unless a correction can be made for the excess of alkali employed. It is true that a slight excess of the latter does not appreciably affect the result, but then the question arises how to make certain that the excess used is but a slight one. It will not do to start with just sufficient soda to render the mixture alkaline, and then to add gradually more as the alkalinity ceases during the titration, because in that case free hydrocyanic acid would be present in the mixture during nearly the whole of the process, and under the influence of the exposure and the continual stirring a portion would inevitably be lost by evaporation, thus causing an error which, though perhaps not considerable, is certainly greater than that which would result from the use of even

an immoderate excess of soda to start with. I find, however, that the following *modus operandi* will meet the difficulty and ensure results agreeing perfectly with those of gravimetric determinations:—The acid is allowed to run from the pipette into an excess of solution of sodium hydrate; decinormal solution of silver nitrate is then added drop by drop until a slight opalescence is produced, and this point being attained, standard normal hydrochloric or sulphuric acid is added until the opalescence begins to increase, which does not take place until the whole of the free alkali is neutralized. From experience I find that for each c.c. of standard mineral acid thus required, 0·01 c.c. should be deducted from the volume of the silver solution used, and the remainder calculated for H Cy. It will be seen that in this process the cyanide of sodium and silver acts as an acidimetric indicator, and, indeed, it answers well for the purpose, for a single drop of free acid produces with it a very distinct precipitation of silver cyanide.

The fact that in the absence of a sufficient quantity of soda the volume of silver solution required to produce a permanent precipitate only indicates that portion of the hydrocyanic acid which has been used up in the formation of sodium cyanide, and that this determination of Na Cy is in nowise affected by the presence of free hydrocyanic acid, renders this method applicable for the analysis of mixtures of the free acid and alkaline cyanides. Supposing the solution to be analysed contained free hydrocyanic acid and potassium cyanide, the volume of silver solution required to produce a permanent opalescence would show at once the quantity of K Cy present. On now adding Na H O in slight excess and continuing the titration until the opalescence is again produced, we find the quantity of free H Cy. The results thus obtained are quite exact.

Before quitting this subject I wish to refer to a very handy process for the estimation of cyanides recently communicated to the Chemical Society by Mr. J. B. Hannay. It consists in the addition of decinormal solution of mercuric chloride to the hydrocyanic acid or cyanide rendered previously alkaline with ammonium hydrate, until a permanent precipitate is formed, which does not occur until the whole of the cyanogen has been used up in the formation of mercuric cyanide, as alkalies have no action on the latter. I have tried the process repeatedly with most satisfactory results, and believe that it will find much favour with pharmacists in the testing of hydrocyanic acid, especially as an excess of alkali does not affect its accuracy. But it cannot be used like the other for the analysis of mixtures of free H Cy and cyanides.

I now come to the second part of my report, viz., the relation of the titration of cyanides to alkalimetry. It stands to reason that if an alkaline cyanide can be correctly estimated in the presence of free hydrocyanic acid by silver nitrate, this titration must answer as well for the estimation of a caustic alkali as for that of hydrocyanic acid. For that purpose the quantity of K Cy or Na Cy found, or the volume of silver solution used, is simply calculated for K H O or Na H O instead of H Cy. Now if the applicability of this test for alkalimetric purposes were confined to the determination of caustic alkalies, I feel certain that nobody would think of using prussic acid and silver nitrate in preference to the customary sulphuric acid and litmus; but I find that it answers equally well with the alkaline carbonates, and here I consider it decidedly preferable to the process in general use, for the following reasons :—

1. The solution of alkaline carbonate does not require boiling, as the carbonic acid does not interfere.

2. The change from perfect clearness to an unmistakable turbidity, as produced by a single drop of the silver solution, is more striking than that of the colour of litmus brought about by one drop of standard sulphuric acid.

3. As a decinormal solution is used the results are more accurate than those obtained by normal $H_2 S O_4$ or H Cl.

4. The result may be readily checked, without the necessity of operating on a fresh portion of the sample.

5. The chloride present in commercial alkaline carbonates can be estimated by the same process with but little additional trouble.

It is well known that hydrocyanic acid does not decompose alkaline carbonates at an ordinary temperature. But in the presence of silver nitrate the decomposition takes place in accordance with the following equation :—

$$K_2 C O_3 + 2 H Cy + Ag N O_3 = K Ag Cy_2 + K N O_3 + C O_2.$$

The first drop of silver solution added in excess precipitates silver cyanide.

$$K Ag Cy_2 + Ag N O_3 = 2 Ag Cy_2 + K N O_3.$$

The weak solution of the carbonate to be tested (about 0·5 to 1 gram in 100 c.c. of water) is mixed with 10 to 20 c.c. of hydrocyanic acid of Scheele's strength (a decided excess), and the decinormal solution of silver nitrate added drop by drop, stirring well all the time until a permanent turbidity is produced. Each c.c. of the silver solution required corresponds to 0·138 gram $K_2 C O_3$ and to

0·0106 Na_2CO_3. I quote the results of a few determinations to show the accuracy of the process:—

Pure K_2CO_3 used.	Found.
0·5850	0·5851
0·1670	0·1672
0·8775	0·8779
0·2088	0·2085

If after the addition of the required quantity of silver nitrate the mixture is boiled down to less than half its volume, or until the excess of free HCy has been completely expelled, then mixed with a few drops of solution of potassium chromate and the addition of silver nitrate now proceeded with until the colour of the mixture changes to red, the volume of the test thus used will be found equal to that used in the first titration. This may serve to check the previous result. In the presence of chloride, however, the number of c.c. used in the second titration will be greater than that used in the first. The difference between the two exactly indicates the chloride.

If 40 c.c. were used in the first and 45 c.c. in the second experiment, the difference of 5 c.c. must be calculated for chloride.

A few of my results will show the value of the method.

Used.	Found.
1. Pure K_2CO_3 0·2000	K_2CO_3 0·2005.
Pure NaCl 0·0683	NaCl 0·0683.
2. Pure K_2CO_3 0·9750	K_2CO_3 0·9750.
Pure NaCl 0·1825	NaCl 0·1830.

Hence I believe that this method merits the attention of those who are much engaged in alkalimetric estimations.

I have also employed silver nitrate with success in the analysis of mixtures of hydrocyanic acid and mineral acids; and indeed I find that these processes may be advantageously extended to other applications, but my experiments in this direction are not yet completed.

The PRESIDENT said this appeared to be a most valuable paper. He had reaped considerable benefit from previous papers by the same author, and he should have the greatest pleasure in applying the present one to practical use.

Mr. WILLIAMS thought Mr. Siebold's suggestions were likely to be of great practical value, though, of course, many of the points he had mentioned were of more importance to those who were not

constantly in the habit of testing hydrocyanic acid and cyanides, than to those who were frequently so engaged. Many of the points mentioned were familiar to him; but some, in which Mr. Siebold by a reverse action checked his first results, were very valuable, and likely to be of great service. He might here mention a subject to which he had alluded a few years ago—the preservation of hydrocyanic acid by means of glycerin. At that time he had a quantity of very concentrated hydrocyanic acid put on one side, and to it he added pure (Price's) glycerin. The strength of the mixture was taken very accurately three years ago, and it was found to contain 37·5 per cent. of real hydrocyanic acid, 37·5 per cent. of water, and 25 per cent. of glycerin. It had been standing ever since, not tied over, in diffused daylight, in an ordinary blue glass bottle, and purposely without any special precautions for preservation, and on the Thursday previous he had it tested again. It then contained 37 per cent. of real hydrocyanic acid, only one-half per cent. difference; in fact, it might be said not to have varied, for he should be sorry to say with hydrocyanic acid of that strength that he could test it to a half per cent. This was an extraordinary fact, and quite confirmed what he suspected from his original experiments, that glycerin had the power of preserving hydrocyanic acid, especially when concentrated, in the most extraordinary manner. It even prevented its diffusion.

Dr. Senier said the plan he had adopted in order to obviate the very great error which arose from following the direction of the ordinary text-books for the estimation of hydrocyanic acid was this. To the diluted hydrocyanic acid he added soda solution to a strong alkaline reaction, which was conveniently determined by means of tincture of litmus. He then added the silver solution drop by drop from a burette, when in most cases the mixture would become acid. When it did so he added more soda solution, and went on repeating this process until the final reading. The great point was to see that the solution was alkaline at the final reading. In this way the addition of too much soda at the commencement was avoided.

Mr. Savage asked if Mr. Siebold had had any experience in keeping hydrocyanic acid, whether in the stronger or diluted form. They all knew that when the bottle had been opened for dispensing purposes, it became sometimes almost inert when not used rapidly.

Mr. Siebold said that he had some slight objection to the process mentioned by Dr. Senier, for reasons stated in the paper. If sufficient caustic soda were used in the determination of the hydrocyanic

acid to produce an alkaline reaction, yet not sufficient to convert the whole of the hydrocyanic acid into cyanide, there was free hydrocyanic acid present during the whole process, and as the titration required continuous stirring, a slight loss of hydrocyanic acid by evaporation could not possibly be avoided. The point raised by Mr. Savage had been discussed a few years ago, when it was recommended, in two papers out of four which were read, that the acid should be largely diluted with water, as an exceedingly weak acid kept much better than a stronger one. In his own experience he found that an acid only one-twentieth the strength of that of the Pharmacopœia kept on the whole very well, certainly much better than the strong acid. Mr. Williams at the time threw out the valuable suggestion that glycerin might be advantageously employed, and having repeatedly tried it for this purpose, he was so convinced of the excellent preserving properties of glycerin, that he too should now recommend its use in preference to the addition of so large a quantity of water as he had previously suggested. Scheele's acid kept very well with the addition of glycerin. His main object in bringing forward his present paper was to show the applicability of the hydrocyanic acid titration to the determination of pearl ash and soda ash; because a very accurate result could be obtained in a few minutes, and without the necessity of boiling the solution. He (Mr. Siebold) thought whoever gave this method a fair trial would adopt it for general use.

A vote of thanks was passed to Mr. Siebold.

The next paper read was on—

THE MICROSCOPE IN MATERIA MEDICA.

By Thomas Greenish, F.C.S.

Vegetable histology is a subject which merits more attention from the pharmacist than it usually receives. The necessity of a general knowledge of botany or the natural history of the vegetable kingdom is fully recognised, but the pharmacist in dealing with the vegetable materia medica requires something beyond and more special than this general knowledge. He should know the organographic locality of the active constituents of the different plants used in medicine, and also something of the histological localization of the particular tissue or tissues in which those active principles reside. The anatomy of these elementary parts of which the

organs of plants are composed constitutes vegetable histology, and the several cells are distinctly visible and capable of being examined and identified only with the aid of the microscope.

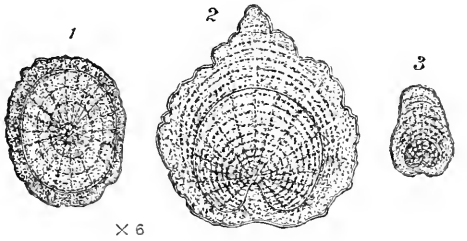
As one instance in point, cinchona bark may be mentioned. Wigand investigated this bark with the view of determining the question which had occasioned some controversy, which of the cell tissues was the seat of the alkaloid? Chiefly through the employment of reagents he came to the conclusion that the alkaloid resided mainly in the bast or liber cells; but the more careful experiments conducted by Carl Müller have settled this question and have placed beyond doubt the fact that the parenchymatous tissue is the seat of the alkaloid in the cinchona bark, and this opinion has, I believe, never since been called into question. The relative proportions, therefore, of bast or liber to parenchymatous tissue in a given sample of cinchona bark, which to a certain extent may be indicated by its short or otherwise fibrous fracture, is an element of some practical value prior to a chemical analysis.

Cultivation, with reference to particular soils, has the property of determining the development of one tissue at the expense of another; for instance, holly cultivated in a rich soil loses the spiny character of its leaves due to prosenchymatous tissue in the excessive development of its parenchymatous tissue. Some medicinal plants by garden cultivation lose much of their medicinal activity. Schroff states that this is the case with the aconites, and Hanbury mentions that the variation in quantity of volatile oil yielded by valerian is influenced by locality, a dry and stony soil yielding a root richer in oil than one that is moist and fertile; and I have but little doubt that this influence of soil is accompanied by a corresponding alteration in the histological elements of the valerian root.

Facts such as these are very suggestive to the pharmacist, and they may on a little reflection be much extended; but they are sufficient to show the value of a study of vegetable histology, without which the influence of soil, climate, and cultivation on the development of particular elementary tissues cannot be accurately determined.

A parcel, supplied as senega root in the usual course of business to a pharmacist, was forwarded to me for microscopical examination. Its being a senega root at all was called in question. It will be observed from the sample that the roots are thinner, of a lighter colour, and have fewer rootlets than the senaga usually met with in commerce. Also the dark concentric rings are not present and

there is an absence of keel, with other characters of lesser importance. A decoction of it as compared with one from an ordinary sample is much lighter in colour and in taste much less pungent. The histological examination proved it to be a true root of *Polygala senega*; a transverse section of it is represented by No. 1 drawing;



No. 2 is a section of a root of a senega of commerce taken across a keel, and showing the general structure to be similar to the preceding; No. 3 is a section of one of the rootlets.

I shall now proceed to describe the tissues histologically. For this purpose No. 2, a section of the senega of commerce, may be taken. The cortical portion or bark of the root is divided into three parts, an outer layer or periderm composed of a series of two or three tabular cells of a yellowish brown colour; next, a middle layer of thin-walled parenchymatous tissue, the outer cells stretched for the most part in a tangential direction. This layer is very unequally developed, when there is a keel to the root, as is the case in this section; on that side it is smallest; from there it increases gradually till it reaches the opposite side, where it displaces more or less completely the inner layer which is the most fully developed on the keel side, where also may be seen the bast or liber cells, and passing through this tissue the medullary rays.

Although the histological elements of these three sections are identical, yet in their relative proportions the three roots differ materially, and to the result of these differences, bearing immediately on the greater or less activity of the root, attention will next be directed.

Senega has probably not received so much attention as other substances of the vegetable materia medica, but Schneider, in 1875,* undertook the determination of the following points, the active principle of the senega root, and what part of the root contained it

* *Archiv der Pharmacie.*

in the greatest quantity; but with the latter part only we shall have to do on the present occasion. Trommsdorf had in 1832 stated that the active principle resided in the bark of the root only, and not at all in the woody tissue of the centre, and Schneider confirmed the correctness of his conclusions by analyses of different roots and different parts of the same root. The conclusions he arrived at may be summed up as follows, giving to the active principle of the root the name of senegin:—

Rootlets	9·26	per cent.	senegin.
Middle-sized Roots . .	3·28	,,	,,
Thick Roots	3·02	,,	,,
Crown of the Root . .	2·6	,,	,,

The central woody portion being inert, I shall pass over that part, and not further allude to it excepting in reference to the space it occupies relative to the parenchymatous tissue, the seat of the active principle. From the conclusions of Trommsdorf and Schneider that the bark only yields the active principle, it will be seen that these sections have an immediate practical bearing on the value of senega root. No. 1, the root in question, has little bark relative to its woody and inert centre. No. 2, a section from a fair sample of the senega of commerce with a keel, has much more bark in proportion to its woody portion, and No. 3, a section of a rootlet, is nearly all bark. Calculating now the superficial area of the parenchymatous tissue of the bark which contains the senegin, and comparing it with the prosenchymatous or woody tissue, which is inert, the relative proportions in the three roots will, approximately of course, stand thus:—

Rootlet, 8·5 to 1 . . .	(or relatively)	17.
Middle-sized Senega, 3 to 1 .	,,	6.
The Senega in question, 1 to 2 .	,,	2.

It will be observed how closely the superficial area of parenchymatous tissue, in which alone the active principle resides, corresponds with the relative proportions of senegin in the roots and rootlets analysed by Schneider.

These enlarged drawings are to scale, and the relative proportions exactly those of the microscopic sections from which they were drawn. It will now be seen why the rootlets yield so much more active principle than either of these roots, and it will at the same time be evident why the sample in question yields a decoction so deficient in strength. Schneider remarks that it would be im-

possible to obtain rootlets in sufficient quantity to meet the demand for senega, and recommends the use of roots of medium thickness, in accordance with the results of his analyses, and probably if these are well furnished with rootlets, so much the better.

The keel, generally considered an important feature of good senega root, is due to a peculiar development of bast or liber tissue on one side, and the same root may be quite round in one part, and have a development of keel in another; this keel is shown in section No. 2. Having isolated the elementary organs of a section across this particular part of the root, separated the tabular cells of the epidermis, the cells of the parenchymatous tissue, and also the liber cells represented by these waves in cellular tissue, and examined the individual cells so separated, I have always found that those of the parenchymatous tissue contained granular and oily matter, whilst the liber cells were free from it; and reasoning from analogous instances I am led to conclude that the liber tissue does not equally with the parenchymatous contain the active principle, and this may probably be the reason why middle-sized roots, with less liber tissue, yield more senegin than those of larger size.

There is no doubt in my mind but that this root, which has been called in question, is that of *Polygala senega*, but it is deficient in cortical portion, the seat of the active principle, and is, I believe, a young and immature root, and consequently one that does not fairly represent the senega of our materia medica from which the preparations of the British Pharmacopœia are directed to be made. I think from what I have stated, and demonstrated by drawings from microscopical sections of different roots of senega, it will be seen how important it is that the senega employed in pharmacy should have its cortical portion fully developed, and the same process of anatomical analysis is applicable to almost every drug with which the pharmacist has to deal.

May I indulge a hope that the time is not far distant when vegetable histology, embracing the isolation and microscopical examination of the tissues so isolated, together with the microchemical analysis of the vegetable cell, will take its place by the side of botany in the practical course of study for the pharmacist; when an intimate knowledge of the seat of the active principles of the plants with which he has to deal, and the relative proportions of the special tissues containing those active principles, will exercise its due influence in the pharmacy, be felt in the drug markets, and react on the sources of supply, so that more judgment as to the time of collecting, and more care as to the mode of harvesting, may furnish

us with the several drugs of the materia medica in the best possible condition for pharmaceutical preparations.

Mr. Long remarked that this paper showed the great advantage of education to pharmacists, but they must become more united and get better paid for their labour. If they were to go on at a bare pittance there would be no possibility of devoting any leisure to these important subjects. His experience was that the assistants of the present day were lamentably deficient in the qualities of men of business, though they might have passed a good examination. They would, he thought, have to insist on a higher education, and raise themselves so as to stand better both with the profession and the public.

Mr. Sumner had anticipated that Mr. Greenish would have made some reference to the large roots which had been on the market lately, which contained almost all woody substance with very little bark. He was glad to have heard such an elaborate paper on so important a matter as senega root. Much of that lately offered had been almost exclusively large chumpy roots, so much so that it scarcely looked like senega at all. He was hardly prepared to hear from Mr. Greenish that in the young root he found so great a yield of wood.

Mr. Umney said if the specimen now brought forward had been put before him on a broker's show-room board he should have rejected it, not so much from the appearance as from the entire absence of aroma, and of any action on the fauces when chewed. He believed he had seen a similar root in the London drug market, and declined purchasing it. Still he had so often appealed to Mr. Greenish for his opinions as a microscopist, and placed so much confidence in his judgment, that but for the observations of Mr. Sumner he should have remained silent.

Mr. Greenish said he believed the specimen to be a young and immature root of senega. It had the characters of that root, and on turning to Göbel and Kunze's drawings he found there three roots, one old root, a young one, and the third one of medium age. The young root was almost entirely devoid of rootlets, whilst the medium root had many of them, and the old root had the appearance usually found, showing the concentric rings, and the keel. Frequently on the upper portion there would be no keel, but on the lower there would be one, due to the excessive development of the inner layer of the bark, which contained the bast and liber cells.

In this root neither concentric rings nor keel were found, but there were furrows in a longitudinal direction, and they so entirely corresponded with the drawing in that work that he believed the root to be that of *Polygala senega*.

A vote of thanks was passed to Mr. Greenish.

The next paper read was—

MISCIBLE COPAIBA.

By T. B. Groves.

Some years ago my brother, Henry Groves (now of Florence), discovered the interesting fact that when a mixture of balsam of copaiba and oil of tartar (a saturated solution of carbonate of potassium) are shaken together and thereby emulsified, the creamy fluid after standing a few days deposits a white crystalline substance, leaving supernatant a clear stratum of apparently unaltered copaiba. It was, however, more or less completely saponified and rendered miscible with water, forming with it a white emulsion. It, therefore, differs essentially from that which is known as soluble copaiba.

Since that time the preparation has occasionally been employed here, but as its applications were limited it did not, until the recent papers on copaiba by Mr. Siebold and others appeared, occur to me to examine the reaction.

As it is I have but made a superficial examination of the question, which, in order to do it justice, would require the expenditure upon it of far more time than I have at my disposal.

A sample some six or eight years old of this miscible copaiba (Bals. Copaibæ, Oj.; Ol. Tartari, fl. ʒij.) presented the following characters:—

It was, as I have already said, similar in appearance and consistence to ordinary copaiba, but instead of having an acid it had an alkaline reaction; and when shaken with water, instead of floating on its surface as ordinarily, it readily formed with it a white emulsion, more or less stable according to the degree of dilution. This emulsion was of course readily destroyed by acids. As regards its behaviour towards solvents it differed little from ordinary balsam of copaiba. The only point worth remarking on in this connection was the fact that alcohol did not affect a perfectly clear solution, and caused after a few days a minute whitish deposit to collect at the bottom of the bottle. The removal of this substance (probably

a resin-salt of potassium) did not, however, affect the emulsibility of the balsam.

So much for the fluid balsam which had been carefully drained off from the underlying white saline deposit. This was found to be imbedded in a pasty resinous substance, on the surface of which were planted numerous crystals, slender needles of from one quarter to half an inch long. The mass having been well washed with benzol these crystals disappeared, and up to now they have refused on the evaporation of the solvent to put in a second appearance. The white substance left after the washing above referred to proved to be entirely composed of minute crystals of bicarbonate of potassium.

The action, therefore, of the acid resins of the copaiba had been this,—to deprive two molecules of the carbonate of half their potassium, leaving the second atom to combine with both atoms of carbonic acid and one atom of water to form the acid carbonate of potassium and water known as bicarbonate of potassium. No evolution of gas, therefore, attends the operation. It seems, moreover, that balsam of copaiba in the cold exerts no action on bicarbonate of potassium. The balsam of copaiba used in making the preparation above referred to was presumably the Maranham variety; it was obvious, however, that as the copaiba balsams of commerce differ as widely in their characters as in their botanical sources, it would be desirable to experiment on well defined samples of known origin. I accordingly obtained from Messrs. Barron & Co., of Giltspur Street, London, authentic samples of Maranham and Para balsams of copaiba and of Gurgun balsam, and treated them as follows:—

In bottle No. 1 were placed $2\frac{1}{2}$ fluid ounces of Maranham balsam of copaiba and $\frac{1}{4}$ fluid ounce of oil of tartar. A fluid dram of this yielded on evaporation 34 grains of solid saline residue.

Bottle No. 2 contained Para balsam of copaiba and oil of tartar in the same proportions.

Bottle No. 3 contained Gurgun balsam and oil of tartar in the same proportions.

Bottles No. 4 and 5 contained Maranham balsam of copaiba, adulterated to the extent of 10 per cent. in one case with linseed oil, in the other with Gurgun balsam. It was thought probable that these admixtures would be at once detected when the oil of tartar should be added; but as such was not the case and an opinion on the subject could not be certainly formed before the lapse of several days, I will not further refer to them.

Each of the mixtures well shaken over night showed signs the

next morning of depositing. It was not, however, until five days had elapsed that the operation seemed complete.

No. 1 had by this time deposited a whitish layer of bicarbonate; over that lay a thin stratum of viscid resin, on the surface of which floated numerous small needle-shaped crystals; above that came the clear balsam, through which could be seen numerous crystals attached to the sides of the bottle. Neither layer was emulsible, although the lower one showed some tendency that way.

No. 2 differed altogether from the preceding. There was indeed the stratum of bicarbonate, but it was less in volume; the viscid resin was absent; the space occupied in the other case by clear balsam was here cleanly divided into two equal parts, the upper portion containing a pale coloured essential oil not miscible with water, the lower portion a saponified balsam of the usual character, except that it had a little more colour.

No. 3 took a considerable time to settle down into three tolerably distinct layers, the lowest portion dark and dense, occupying about one-fourth of the space, the middle of darker colour still but less abundant, the upper fluid both paler and thinner than the original Gurgun balsam. It was not emulsible.

A sixth mixture was now prepared with $2\frac{1}{2}$ fluid ounces of Maranham balsam of copaiba and $\frac{1}{2}$ fluid ounce of oil of tartar. This comported itself very differently from No. 1. It took much longer time to settle, and during the operation deposited neither crystals nor viscid resin. In fact the whole of the fluid portion was saponified and rendered readily emulsible.

It seems then that in order to prepare a perfectly miscible copaiba, the oil of tartar must be added in proportion to the acid resins present in the balsam, and that experiment only can reveal what that proportion should be.

The peculiar behaviour of the Para balsam in contact with the oil of tartar points to the existence of radical difference between it and the Maranham variety. Whether it be anything more than this, that it contains a larger quantity of essential oil than the saponified resin is capable of dissolving, further experiment must decide. I think it must be something more, as I find the essential oil of the Para balsam is not miscible with the completely saponified Maranham balsam, or with the saponifiable portion of the Para balsam, and it is in my opinion quite a moot point whether the essential oil of copaiba is in any proportion soluble in the saponified balsam. In fact I am inclined to regard the Maranham variety as a balsam, the Para variety as a balsam *plus* essential oil.

There are, I am aware, other varieties of balsam of copaiba known to commerce, to which it might be interesting to apply this test; but it would be necessary to be quite sure about the identity and purity of the samples. Balsams of varied origin, and also resinified essential oils, might also be subjected to experiment.

For administration in capsules this miscible copabia would seem to offer some advantages over the ordinary balsam. It would mix more evenly with the contents of the stomach and not float on the surface, causing pain and nausea. Moreover, the alkali present would be beneficial in the class of cases for which balsam of copaiba is usually administered. I have filled a few capsules of gelatine in order to see whether that material would be acted on injuriously by the saponified balsam. I will only add (*miseris succurrere disco*) that they are at the disposal of the members of the Conference, and that any report on their action that I may be favoured with shall be treated confidentially.

Mr. Draper asked the strength of the solution of carbonate of potassium.

Mr. Groves said it was saturated; a fluid dram contained 34 grains.

A vote of thanks was accorded to Mr. Groves.

The next paper read was on,—

BAYCURU.

By Charles Symes, Ph.D.

Baycuru or biacuru is the vernacular name given to a plant growing on the shores of Rio Grande. It imbeds itself more or less in the sand, a number of radical leaves rising above, and being some five to seven inches in length by one and a half or two inches in breadth. The flower resembles that of London pride (*Saxifraga serratifolia*).

The whole plant is sometimes covered by the sea for days and even weeks together, dependent on the direction of the wind, there being no tides in this locality. I am indebted to Mr. Thomas Hallawell for a specimen of the root, and also to Dr. Lundell (both residents in Brazil), for reliable information as to its medicinal properties, and uses to which it is applied. I do not find mention of the plant in Chernoviz's "Formulario ou Guia Medica," which is

practically the Pharmacopœia of Brazil, or in any botanical work at my command. Mr. Holmes has also kindly searched in the Pharmaceutical and British Museum libraries, but has found no satisfactory information concerning it. From a sample, however, with the foregoing description he believes it to be a *Statice*, probably *Statice Brasiliensis*, and although the Plumbaceæ are not generally inhabitants of tropical climates, some do exist there, and from the marked resemblance of the chemical and medicinal properties of these and baycuru it seems very probable that the above conclusion is correct. Further specimens are promised, including a flower, which will of course be more satisfactory for its identification.

The root is the part used medicinally, both fresh and dry. In the latter state the pieces are six or seven inches in length, from one-third to one inch in thickness, and tortuous in shape. The cortical portion is thin, of a dark chocolate colour, contrasting markedly with the central portion, which is of a flesh colour in some pieces, in others darker; the former has an acrid astringent, the latter a purely astringent taste, which suggest the probability that the acrid resin exists in the cortical portion only. The natives have an unlimited amount of faith in its virtues as an astringent and discutient remedy in all kinds of enlargements and glandular swellings, externally as a fomentation, and frequently as a vapour. It is also prescribed by the medical men, not as a specific, for Dr. Landell tells me he has sometimes found it to fail utterly, but as a rule it is reliable both externally and internally, and forms a valuable astringent gargle. The sample which arrived quite recently was only small, and therefore for want of both time and material I have been unable to make as complete a chemical examination of its constituents as could have been wished; nevertheless I will submit the principal results obtained The process followed was that recommended by M. Fleury for proximate organic analysis (*Journal de Pharmacie et de Chimie*, 1872), which with some modifications is that of Dr. G. C. Wittstein (*Anleitung zur chemischen Analyse von Pflanzen.*

The substance to be examined is dried to ascertain the amount of moisture present, powdered, and percolated to exhaustion with anhydrous ether, absolute alcohol, cold and hot water, dilute chlorhydrid acid, and solution of potassa respectively, the residue being dried and weighed between each operation. Fresh portions are then distilled with water, dilute acid (preferably phosphoric), and milk of lime.

The ethereal solution first obtained might contain all substances

soluble in that menstruum, such as fats, resin, wax, volatile oil, alkaloids, glucosides, etc.; it is concentrated and agitated with a little water, allowed to repose, and the different layers are examined for these substances.

The alcoholic percolate is evaporated to dryness, agitated with water, etc., and the other solutions are examined for such constituents as they may contain,—starch, gum, dextrine, albumen, salts, sugar, etc.,—each being tested by the usual reagents for alkaloids; and although I obtained reactions, and even a minute quantity of crystals, which possessed the characteristics of an alkaloid, I cannot regard its existence as actually proved, and must await the arrival of further supplies for its verification. The activity of the root, partly, if not chiefly depends on tannin, of which it contains about 12·5 per cent., and its greenish coloured reaction with iron salts indicates that it belongs to that variety known as mimotannic acid. It also contains 1·3 per cent. of acrid pungent resin, soluble in ether and alcohol; a small quantity of volatile oil; a resinous substance, insoluble in ether, soluble in alcohol; proteic and pectinaceous bodies, starch, colouring matter, chloride and sulphate of sodium, potassium, a soluble silicate, and 14 per cent. moisture. The ash, 4·5 per cent., consists chiefly of soda and silica.

Pharmaceutically, the infusion (ʒss to the pint) and proof spirit tincture (1 to 10) appear to be the best preparations, the dose of the former being one ounce, of the latter one to two drams. An aqueous extract, of which it yields one-third its weight, contains all the astringent properties, but an alcoholic extract contains the acrid resin on which I presume its discutient properties more or less depend.

In conclusion, I would call attention to the apparatus recommended by M. Fleury for the exhaustion by ether and alcohol. It is not new, and is usually mentioned as an apparatus for continuous distillation; but this is really a misnomer, inasmuch as the percolate, and not the distillate is the object for which the process is conducted. I have here a rough sketch of it, my object being partly to point out that it is not altogether the most convenient form, but with some slight modifications it answers the purpose admirably, economising both time and menstruum. An apparatus differing somewhat in form, but of the same character, for manufacturing purposes is illustrated, described, and recommended in Dorvault's "L'Officine," p. 1265.

Mr. DRAPER said this paper certainly required no apology. If it had only contained a description of the beautiful process of Fleury, by which the results were obtained, it would not in the slightest degree matter what was the substance he had examined. Inasmuch as Dr. Symes had indicated a process, which was certainly pretty generally known, but far too little carried out, he had rendered real service. That a systematic method of proximate organic analysis was very much wanted would be readily admitted. This method could not be made too well known, so that when any substance turned up with which they were not acquainted it might be thoroughly examined.

A vote of thanks was passed to Dr. Symes.

The next paper read was entitled—

AUTHORITATIVE FORMULÆ FOR NON-OFFICIAL PREPARATIONS.

BY F. BADEN BENGER, F.C.S.

Some recent proceedings instituted against chemists for selling as "violet powder" a compound consisting mainly of hydrated calcium sulphate, have resulted in convictions, it being held by the magistrates that starch, or a mixture of starch and powdered orris root, can alone be legally termed violet powder. It was not proved that calcium sulphate is in any way injurious as an absorbent application to the infantine cuticle; indeed, what most persons would consider very conclusive evidence to the contrary was freely adduced. Nevertheless newspaper accounts of the prosecutions were headed, "poisonous violet powder," and the defendants, men in a highly respectable position, have doubtless suffered some pecuniary loss, and much annoyance and vexation, through failing to recognise as authoritative, formulæ published in Gray's "Supplement" and similar works. Had it been contended that violet powder should consist of powdered violets we need not have been surprised.

The question which has presented itself to my mind as one of possible interest to this Conference is, then, to what extent are we, as pharmacists, at liberty to apply our acquired knowledge and accumulated experience to the improved manufacture of such articles as violet powder, cold cream, and the like? Are we bound to follow blindly for ever Gray, Cooley, and other "early English" authorities, never questioning the wisdom of the ancients; or is the

other alternative to apply to a magistrate for a formula when it is not to be found in the British Pharmacopœia ?

As violet powder forms the text of this communication, a more special reference to the now authoritative formula may be desirable. Is starch the most suitable substance that can be selected as the basis of an absorbent application to moist and irritable surfaces ? I believe not. It is occasionally acid, frequently alkaline to begin with, and invariably and rapidly becomes acid when moistened and maintained at the temperature of the human body. I find by experiment that pure starch moistened with water and maintained at a temperature of 98° F. for four hours, reddened litmus paper; in eight hours it was distinctly sour to the taste, and a few hours later it had acquired an offensive odour. It is probable that moist violet powder is often left in contact with the skins of children for a much longer period than this, and decomposition would be further advanced. Such a compound of decomposing vegetable matter can scarcely be regarded as soothing. It is within my knowledge that for many years a violet powder has been largely manufactured and sold, consisting entirely of French chalk, silicate of magnesia, in impalpable powder, and this substance I regard as the best basis for a dusting powder. It is quite as absorbent as starch, is unalterable by combined heat and moisture, and possesses exactly the physical properties required in an application intended to absorb moisture, reduce friction, and prevent abrasions. In my own experience this powder has very satisfactorily replaced its ancient prototype, and a recent attempt (made from prudential motives on my part) to return to the formula of my forefathers has met with serious opposition, nursing mothers insisting on being supplied with the silicate, even if shorn of its familiar floral designation.

The Conference has already at its Liverpool meeting expressed a very decided opinion against the employment of misnomers by those who introduce popular remedies, and there is not a word to be said in its favour. Amongst perfumery stock we still have, however, "bear's greases," "taurus marrows," "marrow oils," "lime juice and glycerine," etc., etc. Public analysts will no doubt thank me for directing their attention to these. If we turn to the so-called patent medicines, I fear that in many cases the ingredients indicated by the labels as at least prominent constituents would be the last the makers would think of employing. But there is another class of preparations in common use, the nomenclature of which, though often incorrect, does not seriously mislead the public, and the alteration of which either by assimilating the composition to the name

or by the adoption of new designations, would be attended by inconvenience to both buyers and sellers.

"Spirit of hartshorn" is not a spirit, nor is it now obtained from hartshorn.

"Essential salt of lemons" could hardly be obtained from that fruit by the most skilful chemist.

Ferric oxide is very commonly known as "carbonate of iron:" carbonate of soda as "soda." "Cold cream" is not a product of the dairy, nor does the manufacture of catgut ligatures any longer necessitate the destruction of the feline race.

It would be interesting to know what Mr. Erasmus Wilson thinks he is prescribing when he writes "Aqua Mellis." Gray gives the following formula—

"Aqua Mellis—Honey water for the hair. Honey, 4 lbs.; very dry sand, 2 lbs. Put into a retort or body that will hold five times as much. Distil with a very gentle heat. A yellowish acid water, used to encourage the growth of the air."

So far as I am aware the honey water of high-class pharmacy resembles this only in name, colour, and the use to which it is applied.

Many other instances might be cited, but enough has been said to illustrate what appears to me to be the somewhat difficult position in which pharmacists are placed with regard to the composition and nomenclature of some non-official preparations.

Mr. TANNER said he had always considered starch powder one of the worst things that could be used as an application to the skin. It had been his practice to use French chalk, or silicate of magnesia, and with every satisfaction to his customers.

Professor QUINLAN had listened to the paper with great pleasure, but he could not agree with the writer in his remarks with reference to the prosecutions for selling adulterated violet powder. He followed them in the *Times*, and as far as he could judge the adulteration frequently consisted of white arsenic. Starch was not the best application as a drying powder; starch and orris root was better; but the powder mentioned in the paper was the best of all. With regard to authoritative formulæ of all these things, it was a difficult thing to ask people to tell the secrets of all their business. There were a great many persons who put out patent medicines who would not like exactly to say what was in them. But would it not be well if when a thing was being sold a short analysis should

be attached to it in order that people might see what they were getting? It would be a great advantage even in the case of cold cream to see on the label what it exactly contained.

Mr. UMNEY thought the last speaker had not followed the whole of the cases, as the one he referred to was not, properly speaking, an adulteration, but a mishap. There was arsenic present in the powder, unquestionably, but he had no hesitation in saying that the case was almost parallel to one he remembered some twenty years ago, when "daft" was being used at Bradford in making cheap peppermint lozenges, and arsenic was put in by mistake. That it was a pure accident there could be no question.

Professor QUINLAN said he never meant to imply that it was anything but a pure misadventure. He believed the arsenic was put in by mistake for another mineral powder, terra alba. White arsenic they all knew, was largely used in commerce, and he remembered at one time seeking it lying about on the quay at Falmouth to the quantity of many tons.

Professor ATTFIELD said there had been several prosecutions for what had been termed adulterated violet powder. The one to which reference had just been made, in which arsenic by some mistake got mixed with starch, stood quite alone; but there had been others where the question of arsenic had not cropped up at all, and where the question had simply been, what was violet powder? and it had been held by some magistrates, curiously enough, that violet powder ought always to be starch. Mr. Benger was alluding to some prosecutions which had occurred in Manchester, not in London.

Mr. GROVES said a respectable tradesman in Birmingham had also been fined 20*s*. for selling violet powder not made of starch. Mr. Benger had alluded to improper names being given to articles, and he might mention that in his neighbourhood a great nuisance was growing up by the public calling the compound generally known as citrate of magnesia simply "magnesia." It was bad enough to call it "citrate of magnesia," because it contained no magnesia and very little citric acid, but when it came to "magnesia" simply, it was altogether too bad.

Dr. MACSWINEY took the liberty of saying that the point of most interest to a practical physician in connection with the discussion which had arisen, growing out of the prosecutions about violet powder, was that it would be most desirable if physicians could have a knowledge of the composition of proprietary remedies as they were called. It was within his personal knowledge that these proprietary remedies did not exercise by any means the same effect at

all times when obtained from different sources. Violet powder was an example, and having himself to treat the diseases of children very frequently, he was bound to say he had been often alarmed at the apparent injuries effected by violet powder applied on the surface of the body. He was not an analytical chemist, but he had no doubt that the violet powder on those occasions contained some very irritating ingredient, and that showed how desirable it was that those like himself should know the actual composition of the powder so that they might use their own discretion in directing it to be applied or not. It was admitted that violet powder varied very much in its composition. They were all familiar with the nature of the prosecution which had recently taken place, but the point to which the writer of the paper under discussion alluded, of the arbitrary decision of the magistrates might be regarded from a different point of view. What was the magistrate to do? He had to inquire of the persons best competent to give him an opinion as to what was understood in the trade by violet powder, and in that particular instance it was explained by a gentleman, whom he regarded as an expert, that violet powder should consist solely of a coloured or perfumed starch. Whether starch was or was not the best ingredient to use as a dusting powder for excoriated or irritated skin, was another question, but the magistrate was not to be supposed to know more about the matter than chemists and druggists knew, and there was evidently a difference of opinion amongst chemists as to what should be the constitution of violet powder. His own impression was strongly against the statement that a vegetable was inferior to a mineral dust to apply on these occasions. He was inclined to think that a vegetable dust, properly applied, was more likely to be beneficial and less likely to be irritating than a mineral one. Calcium sulphate was an irritant to the stomach, and consequently he thought it would be a dangerous substance in a particular class of delicate skins, to apply constantly, as they knew ladies were now in the habit of doing, when dusting their faces before going out. His desire, however, was to state his opinion that it would be for the benefit of medical practitioners if they knew the precise constitution of various remedies now subject to great discrepancy in composition. Magnesia, or citrate of magnesia, had been mentioned, and in conversation with Mr. Williams he had been told what, as a practical physician, he had no reason to expect would be the case, that the less magnesia the preparation contained the better it was. That was a very undesirable condition in any pharmaceutical preparation, that it should have a name which was calcu-

lated to mislead. He also wished to say, with great respect to pharmaceutical chemists, that he thought they were slightly travelling out of their domain in determining what was or what was not a desirable application to the interior or exterior of the body; that duty, he apprehended, appertained to the calling of the physician. It had been stated by the writer of the paper that such and such results might be expected to follow from the application of these powders, and he should wish to ask him how he derived his knowledge on the subject. Was it by mere theoretical reasoning, or was it from the practice of the medical art? Because in order to the writer having a knowledge of what was good for the exterior or interior of the body, merely high scientific acquirements and acquaintance with the chemical, pharmaceutical, or physical properties of bodies, were not sufficient; he would require to be a physician.

Professor ATTFIELD quite agreed with Dr. MacSwiney that it was not the province of chemists to interfere with questions of physiology. They were anxious to know from medical men what was the effect of these vegetable or mineral powders on the skin, and guide themselves accordingly. Perhaps Dr. MacSwiney would enlighten the meeting on this point.

Mr. HOLMES had heard that day for the first time that sulphate of lime had been always used as violet powder. He had been in the trade for twenty years, and always considered that what was known as violet powder was powdered starch, perfumed, and nothing else.

Professor TICHBORNE said the term violet powder probably arose from that fact of the original violet powder being a mixture of starch and orris root; at any rate, what was known for many years before as violet powder was starch, though latterly a great number of things had crept into the market. It was quite true that from a chemical point of view starch was liable to change, and a solution would become acid; but many of the better kinds of violet powder were chiefly formed of perfumed starch, with the addition of a little carbonate of magnesia, which perfectly remedied this defect. As to the irritating effects of sulphate of calcium, that might be explained in this way. There were some sulphates of calcium which would unquestionably irritate mechanically; he had seen sulphate of lime crystallized in very fine crystals, and he could not imagine that it would be desirable to apply such a powder to an irritated surface. He would conclude by suggesting that violet powder was a preparation of sufficient importance to be introduced into the Pharmacopœia, or a powder to be used in its place, and he hoped in a future edition a formula would be introduced.

Mr. CHIPPERFIELD said things formed on theory were not always borne out by experiment. Mr. Benger, according to his theory, had to a certain extent proved that violet powder made of starch would be rather injurious than otherwise. He had been perfectly astounded to learn from the different prosecutions that had taken place that anything but starch had ever been used. In all the situations he had ever held he never learned that anything else was used; and although Mr. Benger had apparently established that starch would be attended with injurious results because of its tendency to turn acid, he had never heard of any violet powder he had supplied having any injurious effect, though it was used for dusting babies, and ladies' faces. He should be sorry to see calcium sulphate introduced, and should hesitate very much about using French chalk. He believed whenever these things had been used, with very few exceptions, it was because they were cheaper than starch powder.

Mr. SIEBOLD agreed with Mr. Benger as to the suitability of French chalk, and could see nothing objectionable in very finely powdered sulphate of lime. He also agreed with the statement that starch in a moist state at the temperature of the human body turned acid very soon, and it was at least possible, if not proved, that it might in that way irritate. But the question before them was not whether starch powder was irritating or not, but whether these mineral powders which had been objected to were really objectionable. They were not compelled to use starch, only compelled by law not to use mineral powders. Now he demanded proof that they had ever done harm. No doubt they might meet with medical men here and there who would say: "I can conceive that a mineral powder showing a crystalline formation under the microscope might possibly do harm." But what did that come to? It was merely a personal opinion or conjecture, entirely unsupported by actual observation, and was opposed to the positive knowledge which they had to the contrary. Several manufacturers had sold mineral powders for this purpose, and sold them at the rate of one ton per week for upwards of twenty years, and if such powders had been so used day after day in hundreds and thousands of families and there had never been any complaint, that was overwhelming evidence as compared with the personal impression of one or two or half a dozen medical men. It had been said that the original violet powder was a mixture of starch and orris root. All he knew about it was that the original violet powder was orris root powder pure and simple, and that it had long since been found out that orris root was not by any means suitable for a dusting powder. If they

must have a vegetable powder lycopodium was a very good thing, and that was used in many parts of the Continent. They had nothing to do with the origin of the term. If they found they could improve on a preparation, especially one not in the Pharmacopœia, they were entitled to make use of their knowledge; and it seemed very hard that chemists and druggists, with their life-long experience, should be taught by magistrates, who knew nothing at all about the subject, what the composition of a toilet article ought to be. No doubt there was a certain excuse for them, because they relied to a great extent on the statements of public analysts; but the mere fact that a public analyst had obtained an appointment was not in all cases a sufficient guarantee that he knew his subject. He considered that chemists and druggists were a little to blame for some of the ridiculous decisions on the part of magistrates. They should take care by united action to put such pressure on the Local Government Board that no appointment of a public analyst under the Food and Drugs Act would be sanctioned unless it were proved that he had acquired a proper knowledge of drugs as well as of food. It became, in his opinion, the duty, not of individual chemists and druggists, but of local associations, to insist that men appointed under the Adulteration Act were not ignorant of the chemistry of drugs, as some unquestionably had proved to be. He was far from wishing to cast the slightest imputation on public analysts as a body, knowing that many of them possessed in a high degree the knowledge and skill required for the efficient performance of their duties, but it could not be denied that in some instances honest traders had suffered great annoyance and loss of reputation through the blunders of incompetent analysts.

Mr. Greenish said he had examined a great many of these powders, and it was impossible to look at them with a tolerably high power without being convinced that the angular character of the crystals must be irritating to tender surfaces, as compared to granules of starch. He was quite satisfied on that point. Dr. MacSwiney had alluded to the ignorance of medical men on the composition of certain articles, but he considered they had the remedy in their own hands; they should not order any article for medical use the composition of which had not been published.

Mr. Williams wished to correct Dr. MacSwiney on one point. When speaking to him on the subject of citrate of magnesia he did not say that it was better without any magnesia, but simply that the public liked it better. With regard to violet powder, he had

had no suspicion all his life that anything but starch and orris root was used until this case of arsenic poisoning had arisen. He then found to his great astonishment that he was perfectly ignorant of his business, or that portion of it, and that there were substances used which they were informed by some gentlemen were much superior to starch. He himself, however, could not see that at all. Hydrated sulphate of lime, or *terra alba*, the basis of the so-called violet powder now used, was not only crystalline but soluble, and if you took a dose of it, it would act as a purgative. Now, it appeared to him that what acted in the interior on the mucous membrane was probably irritable also, to say the least of it, on the exterior portion of the skin. He could not agree that violet powder ought to be anything but starch and orris root, and those who changed the violet powder to something else, although they might make a large profit by it, he thought took a responsibility in retaining the name for another preparation which was not justifiable.

Mr. Long said that although there had been prosecutions in many parts of the country in reference to violet powder, the source from which the agitation arose was one and the same, but fortunately no other occurrence of the same kind had taken place. It was made by Mr. King, his object being undoubtedly to produce a cheap article, though no doubt the evil results were accidental. They were much obliged to Dr. MacSwiney for his remarks, and whilst maintaining their own independence they always paid great deference to what physicians said, but in such a matter as that they were not originating or devising anything for medicinal purposes, but were only competing with the barber. The barber made vast quantities of this violet powder, and, in fact, chemists really ought not to have anything to do with it. If physicians would only place confidence in pharmacists, and if they wanted to know what their patients had been purchasing, would simply come and ask, he was sure that any respectable tradesman would give the information.

Dr. Symes said Mr. Benger's argument was that French chalk was superior to starch powder, but the discussion had gone entirely away from French chalk to sulphate of lime. It was by no means a new thing that violet powder did not consist of starch, for ten years ago a very old chemist, who had retired from business, advised him to use powdered French chalk, saying, if he did so once he would never use starch again. He introduced it at first very cautiously, and the first thing that struck him was that his violet powder was getting more like that of a celebrated maker, which fetched a much higher price. He then increased the quantity, when it became still

more like this celebrated violet powder which fetched double the price paid for the ordinary article, and for the last few years he had used nothing but French chalk with as little perfume as possible. In some cases where irritation was produced he believed it arose from the large amount of essential oil used to perfume it. The gentleman he referred to told him he had been using French chalk for twenty-five years, and that was ten years ago.

A vote of thanks was then passed to Mr. Benger.

The next paper read was entitled—

SOLUTION OF IODOFORM AND IODOFORMED LINT.

By G. A. Keyworth, F.C.S.

When iodine tincture is shaken with a fragment of fused potash, so as to remove the colour, the essential step in the preparation of iodoform, the characteristic odour of that substance, appears. In this simple form the fluid possesses great energy as a therapeutic agent, more especially in the healing of indolent sores, for which purpose iodoform is so highly valued by some medical practitioners. Iodine ointment of various strengths, alone or combined with a small quantity of carbolic acid, has long been known to have great power in producing cicatrization and granulation with obstinate ulcers, sores, and wounds. The odour of iodoform, which is to many persons very repulsive, may be readily concealed by the addition of eau de cologne or lavender water.

The alcoholic solution above described, when so treated, furnishes an elegant substitute for iodine tincture, with its dark colour, strong chlorine-like odour, and staining property. Lint soaked in this colourless perfumed liquid and allowed to dry, is a singularly useful application for various sores, promoting the healing process with much energy. Equal parts of this fluid and glycerine form a very useful combination for many purposes.

A vote of thanks was passed to Mr. Keyworth, and the Conference then adjourned.

Wednesday, August 14, 1878.

The Conference resumed this morning at 10.30 a.m., when the reading of papers was proceeded with. The first paper read was a—

NOTE ON AN IMPROVED PREPARATION OF ERGOT.

By A. W. Postans, F.C.S.

It is only right to preface my remarks on this subject with a statement to the effect that the liquid extract I desire to bring before the Conference is what I have considered to be an improvement on the process given in the Pharmacopœia of the United States of America, and the resulting preparation is possessed of stability, activity, and good keeping power.

It is at once obvious that however highly esteemed by some medical men the freshly powdered ergot may be, yet a fluid extract, on which reliance can be placed, has such manifest advantages in convenience of exhibition, accuracy of dosage, etc., that to find one even equal to the freshly powdered ergot is a gain.

In the following observations I do not propose to analyse the different samples of ergot, although that is a most important starting point. I do not propose to suggest any new method for the preservation of ergot itself, nor to assert positively to what it owes its activity; and the general history of the drug, as well as its adulterations and occasional admixture with ergot of wheat, ergot of oat, and various other inferior ergots is so exhaustively dealt with in 'Pharmacographia' that I may fairly pass on; with the intimation, however, that I shall hope on a future occasion to give an account of the value of liquors obtained from ergot of oat and ergot of wheat.

The process I have adopted is as follows:—

To 20 ounces of freshly powdered ergot packed in a percolator, the extremity of which had been closed, was added a mixture containing 10 ounces each of rectified spirit and glycerine, and 5 ounces of water; the whole was then allowed to macerate for a week, at the expiration of which time the percolation was proceeded with, and the subsequent displacement continued with distilled water until the drippings almost ceased to have any taste or colour. Eighteen ounces having been collected of the first liquid, the remainder was evaporated gently in a water-bath to 2 ounces, and then mixed with the previous quantity, so that 20 ounces of this fluid extract exactly represents 20 ounces of freshly powdered ergot;

and I am told by several obstetricians of eminence that it is highly satisfactory.

In conclusion, I desire to point out that the main difference between the above process and the American consists in the addition, by the United States Pharmacopœia, of half an ounce of acetic acid to each 16 ounces of liquor, thus rendering, in my opinion, an otherwise good preparation nauseous and unpalatable, as well as presenting a difficulty as to the desirability and wisdom of introducing acid into the stomachs of patients. These are points which, at certain times, it is most necessary for the physician to consider and the pharmacist to determine.

Mr. WILLIAMS inquired if this preparation contained the oil, as well as the other ingredients.

The PRESIDENT said he was glad to know that Mr. Stoddart was working rather closely on this subject, and would have prepared a paper for that meeting, but unfortunately the season was a little backward in the West, and he had not been able to obtain the ergot in good condition. Before their next meeting, however, he had no doubt he would have investigated the subject, and he would not therefore make any remarks on this paper.

Mr. GREENISH remarked that this process of Mr. Postans was as nearly as possible that of the United States Pharmacopœia, and he should have liked to hear some scientific reason given for his slight deviation from that process. According to that, there was a small quantity of acetic acid added, and there was a reason given for this addition, the object being to prevent volatilization of the active principle while the process of evaporation was going on. He should like therefore to hear from Mr. Postans some equally valid reason for leaving the acetic acid out of the process. One of the latest treatises on ergot was that of Blumberg, which appeared in the *Journal* about a month ago, and the subject was treated in the most exhaustive manner. He stated most distinctly that he was able to obtain all the active principles merely by percolation with water, and that there was no necessity for using any other menstruum. From the researches of Dragendorff on this subject it would appear that great care was required in the introduction of spirit, because one of the active principles, sclerotic acid, was very liable to be thrown down by alcohol beyond a certain strength.

Mr. UMNEY thought he could see one disadvantage in this process, He imagined that alcohols, whether 56 o.p. or even in the more

dilute form, would take up the fixed oil. The use of ether had for years been recognised, after a full discussion, to be a mistake, and Professor Redwood had acknowledged that it involved a waste both of time and money. He had manufactured fluid extract of ergot on a large scale by the use of water only. Water would not touch the fixed oil, but it would take up the whole of the active principle, and if a fluid extract thus prepared were preserved with the proper proportion of alcohol 56 o.p., there was no difficulty in keeping it in excellent condition.

Mr. Groves was rather surprised that the tincture of ergot was not more frequently used. It was a very simple preparation made with weak spirit. He believed it contained all the active principles; it was made entirely without heat, and seemed a better representative than any of those which required more manipulation. He knew it was active, because he supplied it constantly to a gentleman in his neighbourhood in large practice. With regard to the keeping of ergot he would make a suggestion. They all knew how prone it was to decay from atmospheric causes, the attacks of insects, mildew, etc., and that was no doubt due in great measure to its form as well as to its constitution. He would suggest that it should be ground and subjected to great pressure in a hydraulic press, so as to bring it into the form of cubes. By this means the fixed oil, which had no action, would be got rid of, and it would be less exposed to the attacks of insects, and might probably be preserved for many years. He had no means himself of trying the experiment, but he hoped some one who possessed a hydraulic press would do so. The pressure would break up the cells, and render it more easily exhaustible when powdered.

Mr. Gerrard said he had had some experience in the manufacture of the official preparation, and he should like to ask Mr. Postans what special advantage he claimed for this over the liquid extract of the Pharmacopœia. When a novelty of this kind was introduced it ought to possess some advantage over the preparations already in use. The B. P. preparation was very efficient, and the only fault was the use of ether, which was now generally omitted because practical pharmacists knew that it could be made equally well without. According to the official formula also, water of a certain temperature was directed to be used, but he had pointed out in the *Journal* some time ago, that he could make a better liquid extract by using cold water, simply because water at a higher temperature decomposed the ergot and caused changes which might affect the activity of the extract.

Professor ATTFIELD said the pharmacy of ergot, like that of every drug, must be founded on their knowledge of its therapeutics, or of its chemistry, or on both. Mr. Postans said he founded his knowledge of the efficacy of this preparation on therapeutics, having placed it in the hands of those who found it active. Undoubtedly it was desirable that they should found their pharmacy of it on its chemistry, but having lately read the researches to which Mr. Greenish alluded, he was not convinced that they yet knew what the active principle or principles were; and therefore they were not yet in a position to depend on its chemistry for their treatment of it. He was satisfied, however, from the eminence of two or three of the men who were working at the subject, that in the course of two or three years the chemistry of ergot would be opened up, and they would then be able to found their pharmacy upon sounder knowledge than they now possessed.

Dr. SYMES thought Professor Attfield had scarcely answered Mr. Gerrard's question. He said that when a new preparation was introduced, it should be shown that it had some superiority over the one already existing. The mere fact that this preparation answered its purpose was no reason why it should replace that of the B. P. Both the liquid extract and the tincture, prepared according to the Pharmacopœia (with the omission of the ethereal extraction), were efficient preparations, and it did not strike him that this was any improvement, though possibly it might have advantages of its own.

Mr. BOILEAU asked if the age of the ergot had anything to do with the efficacy of the preparation. It was a most important article, especially to the obstetrician, and he had seen great difference in different specimens, some being almost inert, while others were very good. The young ergot was very different generally to that which had been kept for any length of time.

Mr. GREENISH said that whatever might be the active principle of ergot, it was admitted by every writer on the subject that the active principle could be extracted by water. With regard to the therapeutic efficacy of these preparations, ergot was given in nineteen cases out of twenty as a matter of course, and the confinement would take place quite naturally, and would have done so without any ergot being administered. It was in case of hæmorrhage afterwards that the real efficacy of the ergot was put to the test.

Mr. LONG said ergot was now being used largely in spitting of blood from the lungs.

Mr. POSTANS said he should have been disappointed if at such a meeting some gentleman had not shown that loyalty and conservation for official preparations which was indeed the natural order of

pharmacists. The idea of bringing this forward was suggested to him by the "blue list" issued prior to the meeting at Plymouth, in which there was a line "Ergot, new preparation required." With regard to a hot water infusion, there could be no doubt that the active properties were taken up, but the difficulty with such a preparation was that it would not keep unless spirit was added. His experiments were not sufficiently conclusive to enable him to state whether the oil was taken up, although that was considered to be inert. It was believed that in the evaporation of the subsequent liquor, the heat used was more than the active principles of ergot would allow without producing some change, and therefore the acetic acid was added with a view to preservation by forming salts with the bases. His experience, however, had led him to the conclusion that this addition was unnecessary. His object was not to supersede the British Pharmacopœia preparation in any way, but he believed this process to be an improvement upon it.

The PRESIDENT said they were much obliged to Mr. Postans for giving the results of his experience, for with Professor Attfield's authority for the opinion that the chemistry of the matter was still somewhat vague, all that could be done was to experiment empirically. There was no doubt that a large amount of the mystery which attended the chemistry of this subject consisted in the fact that ergot was not the same at all periods of its development. Up to that time all experiments had been made on the ergot obtained in the market, about which nothing was known as to its growth, condition of development, or season of gathering; but on this point they must look for some information next year, because Mr. Stoddart was paying great attention to the individual granule, and was having them gathered in a period of development which he would be able to speak to positively when he came to experiment upon them.

The thanks of the Conference were accorded to Mr. Postans.

The next paper read was on—

A COMPARISON OF THE STRENGTH OF SOME OF THE CINCHONA PREPARATIONS.

By CHARLES EKIN.

1. Two hundred and fifty grains of apparently a good sample of calisaya bark were reduced to a fine powder and mixed with milk of lime, made of 100 grains of dry slaked lime and 600 grains of water. This mixture was dried thoroughly at a low temperature (in the sun) and treated with 6000 grains of alcohol in successive

portions after Dr. de Vrij's method (*Pharm. Journ.*, 3rd series, iv., 241).

The alcoholic solution was slightly acidulated with sulphuric acid, filtered, and the filter well washed. The greater part of the spirit was recovered by distillation, and the residue poured into a capsule to which were added the spirit and the water with which the retort was subsequently washed. The capsule was heated on a water-bath till all the spirit was expelled, and the remaining liquor after cooling was filtered, and the filter and its contents washed repeatedly with water slightly acidulated with sulphuric acid until caustic soda ceased to produce any turbidity in the passing liquid. The greatest care was used in this and in the previous washing to guard against the slightest loss. The liquid was reduced in bulk on the water-bath, transferred to a stoppered bottle into which the washings of the capsule were also placed, rendered alkaline with ammonia, and agitated with sufficient chloroform in three successive portions. The chloroform solution was separated by a funnel and evaporated on a water bath until it ceased to lose weight. The dry residue, which may be taken to represent the total alkaloids of the bark, weighed 4·9 grains or 1·96 per cent.

2. Two and a half ounces of tincture made from the same bark were slightly acidulated with sulphuric acid, evaporated to expel spirit, cooled, filtered, and the filter and its contents washed, as in the bark assay, with water acidulated with sulphuric acid. The filtrate was transferred to a quart bottle, rendered alkaline by ammonia, and thoroughly shaken with a pint of chloroform in two successive portions. The chloroform solution was separated by a funnel, the bulk of it recovered by distillation, and the residue with the chloroform washings of the retort evaporated to dryness, yielding 4·15 grains total alkaloids.

3. Eight ounces of infusion of the same bark were concentrated and treated as No. 2, giving a residue of 2·3 grains.

4. Ten ounces of decoction of the same bark, treated in the same way, gave 3·45 grains.

5. One fluid dram of fluid extract of the same bark, having a specific gravity of 1·1, gave 1·05 grains.

6. One fluid dram of Battley's liquor cinch. cord., taken from a bottle freshly opened for the purpose, and equal according to the label to one ounce of the finest bark, after the same treatment gave 2·05 grains.

These results tabulated according to their percentages are as follows:—

	Total Alkaloids.
100 grains of bark yield	1·96 grains.
500 min. tincture (made from 100 gr. bark) yield (About ʒix.)	1·89 ,,
2000 min. infusion ,, ,, ,, (About 4½ ounces.)	1·31 ,,
1600 min. decoction ,, ,, ,, (About 3½ ounces)	1·26 ,,
25 min. fluid extract ,, ,, ,,	0·47 ,,
13 min. Battley's liq. cinch. cord. (equal according to the label to 100 grains bark) yield .	0·46 ,,

The proof spirit tincture therefore nearly exhausts the bark. Boiling water, as in the case of the infusion and decoction, takes up about five-eighths of the alkaloids; and cold water, as in the case of the fluid extract, takes up, or at all events only retains, about one-fourth.

As manufacturers well know, many yellow cinchona barks, even though rich in alkaloids, are not suitable for the preparation of the liquid extract. I therefore applied to one of the first West-end London houses, who kindly supplied me from their own stock with a suitable sample, and from which they themselves prepared the liquid extract.

It will be seen the sample, provided Dr. de Vrij's method of assay entirely exhausts the bark, barely comes up to the Pharmacopœia standard, even if the total alkaloids consisted for the most part of quinine, which from their almost entire solubility in ether is not improbable.

The yield from the tincture seemed to me very high. I therefore after the tincture was made continued the exhaustion of the bark by percolation with proof spirit until colour and taste were almost entirely absent.

This last product yielded a residue equal to 0·23 grs. of alkaloids to 100 grains of bark, bringing up the total alkaloids to 2·12 or 0·16 in excess of the quantity obtained from the bark itself. This excess may be due to a small quantity of quinovin being dissolved by the chloroform.

The quantity of chloroform used to take up the alkaloids seems large, but no less a quantity would break up the gelatinous fluid first formed (and which was due probably to a large excess of quinovic acid), and so insure complete separation.

The bark yielding to all appearance an excellent preparation of liquid extract, I was curious to compare it with Battley's, hence my examination of the latter.

The results show that Battley's liquor, although by no means representing the finest bark in the proportion claimed, is twice the strength of the B. P. preparation. The latter, however, if made from a richer bark might have been richer in alkaloids, though judging from my own limited experience, I should say this by no means follows as a matter of course.

Exception might be taken to the residue from the chloroform solution being given as necessarily consisting entirely of alkaloids. I am fully alive to the doubts that may exist on this head. In this case, however, I am inclined to think the evidence is decidedly in favour of the alkaloids being as I have given them. At any rate an error would affect all the results alike and in the the same proportion, and so not vitiate them for the purposes of comparison.

Before discussing Mr. Ekin's communication the following paper was also read :—

ASSAY OF CINCHONA.

By John Barker Smith.

Cinchona bark, cinchona preparations and alkaloids, and nearly all the important preparations of vegetable substances contained in our Pharmacopœia, may be estimated with the greatest facility and approximate accuracy by means of a weak solution of permanganate of potassium.

A stronger solution of permanganate may be made, which will keep several days, by adding one gram of permanganate to one hundred c.c. of distilled water.

The solution used in the actual examination is made by diluting ten c c. of the stronger solution to a litre with water.

Fifty c. c. of the dilute solution, acidulated with sulphuric acid, and corresponding to five milligrams of potassium permanganate, is the standard quantity invariably used. The preparation to be estimated should be diluted, regularly admitted from the burette, and the point of decolorization selected for the termination of the experiment.

Exhaustion of Bark and Estimation of the same.

1. *Rectified Spirit Extraction.*—By careful percolation, after maceration, to ten parts, the bark is practically exhausted. Less than one per cent. of oxidizable matters (cinchotannic acid, alkaloid,

etc.) in fact was found in the last quarter of the percolate to ten and of this only a quarter was alkaloid.

Experiments.

Maceration and percolation to ten volumes, each quarter separately examined.

	Percolates.	1st.	2nd.	3rd.	4th.
Percentage	Oxidizable Matters .	14·0	3·5	1·5	·9.
	Alkaloid .	3·1	·8	·4	·2.

Total oxidizable matters nearly 20 per cent., of which a quarter might be alkaloid.

The data for these experiments consist of twenty milligrams being selected as the quantity both of alkaloid and other oxidizable matters in bark required to decolorize the standard quantity of permanganate solution.

Alcoholic tinctures of bark may be estimated by first diluting and verifying total oxidizable matters, and afterwards the alkaloids by precipitating another portion of the tincture with lime, filtering when cold, diluting, and estimating as before.

As regards the official tincture of yellow bark, and those prepared by the same process with other commercial bark (red and East Indian), my experiments have indicated that they should, when submitted to this process, show a possible percentage of alkaloid in the preparation of ·6 or 3 for the bark used, and at least three times as much total oxidizable matters as of alkaloid.

I think an approximation may also be made to the quantities of cinchonine in such tinctures by suitable dilution. An example will best illustrate:—

5 c.c. of a tincture of red bark, diluted to 100 c.c., form a solution of which 20 c.c. decolorize the standard acid permanganate. Another portion of the tincture treated with acetate of lead and ammonia, and diluted with water to ten volumes, forms a solution, of which 28 c.c. decolorized before filtration and 34 c.c. afterwards. Or when calculated, our tincture may be said to contain 2 per cent. of oxidizable matters, ·7 per cent. of alkaloid, of which one-fifth may be cinchonine.

So far as my experiments extend an approximation of the percentage of alkaloid in a bark may be rapidly made by first washing the powdered bark with ten volumes of a 1 per cent. caustic soda solution by percolation, and afterwards exhausting the bark by

percolation with rectified spirit to twenty volumes. Estimating the tincture as before.

Experiments.

a. Gravimetric, 2·7 per cent. impure alkaloid.

b. Permanganate, 2·8 „ „

2. *Cold Aqueous Extraction.*—Scarcely more than a fourth of total oxidizable matters extracted by twenty volumes of water, half the alkaloid also remaining in marc.

Experiments.

Maceration and percolation to twenty volumes, each quarter separately examined:—

Percolates.		1st.	2nd.	3rd.	4th.
Percentage	Oxidizable Matters . .	3·5	1·	·57	·36
	Alkaloid . .	2·4	·4	·3	—

The alkaloid in the first quarter was determined again by the lead and ammonia method, and was found 1·8 per cent.

3. *Hot Aqueous Extraction.*—These experiments show that the official infusion will compare very favourably with decoction, and that both methods are effectual in extracting the greater part of the alkaloids. Lead seems better than lime as the precipitant when water is the menstruum.

Experiments.

	Percentage Results.		
	Oxidizable Matters.	Alkaloids.	
		Lime.	Lead.
Infusion, one hour, paper filtration	8·7	4·7	2·7
„ two hours „ .	7·9	4·7	2·5
Decoction, official . . .	7·7	—	2·4
„ „ strained hot .	8·7	4·7	—
„ repetition with marc .	4·3	1·5	—
„ official, acidulated .	11·2	—	3·1

The above are the records of actual experiments by the permanganate process, and the author therefore hopes that they will be accepted and found useful. Percentage results, of course, refer to the bark itself.

Professor ATTFIELD had gathered from a previous memorandum he had received from Mr. Smith, giving only his results, and also from some letters, that he proposed to estimate the value of any

drug, the active principle of which was precipitated from its solution by lime, in this way. He took an aqueous decoction or infusion of the drug, and added permanganate of potassium until all the oxidizable matter had been oxidized. Then he took a similar portion of the aqueous decoction, and precipitated the alkaloid from it by lime, filtered it, and then estimated the amount of oxidizable matter in the filtrate, which would now contain no alkaloid, and the difference between the two quantities of permanganate of potassium added he considered indicated the amount of alkaloid. The foundation of that statement was that he had examined a third portion of his infusion or decoction in the ordinary way, and obtained by that means a certain quantity of alkaloid which, as he said, corresponded with the amount obtained by his own method, and inasmuch as this was much more rapid than the ordinary gravimetric method, the author claimed advantage for it.

The PRESIDENT said it would seem to be implied that the addition of the lime separated nothing but the alkaloid.

Professor ATTFIELD said that apparently the author did not altogether take into account that something else besides alkaloid might be precipitated, and that the total quantity of alkaloid might not all be precipitated. A great deal would have to be done evidently before a method of this kind could be relied upon for the assay, either of cinchona bark or of drugs generally.

Mr. WILLIAMS said there was one point in Mr. Ekin's paper which he should like to have cleared up. Did he understand correctly that the liquid extract from a certain known bark yielded much less alkaloid than a tincture from the same bark?

Mr. EKIN said, Yes; the same sample of bark was used in all the experiments.

Mr. UMNEY said Mr. Ekin's paper was a most valuable one. For some time past they had been looking for a table showing the relative values of the official preparations of bark. Mr. Smith's paper he did not feel competent to discuss, as he could hardly follow it, and it seemed to contain something quite novel. Mr. Ekin's paper brought out very strongly the imperfections of the fluid extract of the B. P., and showed how wasteful it was, as had been long known. Manufacturers knew that according to the natural acids contained in the bark, so would only 40 to 60 per cent. of the alkaloid be removed, and on an average they did not get out more than half, varying according to the amount of quinovic acid present. The fluid extract of the B.P., as now made from calisaya bark, varied considerably, and the calisaya bark had deteriorated to a fearful

extent of late; so that in a few years he believed it would be altogether a thing of the past, and they would have to depend on East India bark containing 5 or 6 per cent. of quinia for fine fluid extract.

Professor MARKOE said the subject of Mr. Ekin's paper had excited a good deal of attention in the United States. The preparations of calisaya and red bark had been much studied by some of the best men, and they long ago came to the conclusion that all efforts to get a satisfactory preparation of bark by the present modes of treatment were entirely wrong in principle and total failures in practice. This was recognised in the United States Pharmacopœia, which directed that even in making an infusion aromatic sulphuric acid should be added to make the alkaloids more soluble and prevent the loss of a large portion of the active principle. Following on that principle they had a fluid extract which fairly represented the bark in the proportion of a minim to a grain. They used three volumes of officinal alcohol, sp. gr. ·835, and one volume of glycerin, and with this menstruum there was no difficulty whatever in totally exhausting the bark; but it was a question with them whether that had any advantage over a purely alcoholic menstruum. Dr. Squibb had demonstrated that it was easy to make a preparation which should be fluid enough to drop easily, containing as much as two grains in each minim, and which would not precipitate. He agreed with the remarks of Mr. Umney that calisaya bark was getting to be a very unsatisfactory drug, and in the States they had perhaps even greater difficulty in getting it of good quality than in England, and the East India barks were now being preferred. With regard to solid preparations of cinchona, the present officinal formula of the United States Pharmacopœia directed a double treatment. The bark was first percolated with a certain proportion of alcohol, and afterwards this was continued with water. The alcoholic percolate was evaporated to a syrupy consistence, the aqueous percolate was then evaporated, and the two mixed together. Carefully conducted experiments, however, made by a number of investigators had shown that the alcoholic treatment was quite sufficient to thoroughly extract the whole of the bark, and that the addition of the aqueous extract simply served to swell the bulk of the preparation without adding any value to it. They were, therefore, now using, instead of the officinal preparation, the alcoholic extract. In the next Pharmacopœia, if glycerin were used at all it would only be to a small extent; in fact, its wholesale use in the U. S. Pharmacopœia was in spite of the protest of the best pharmaceutical workers in that country, and owing to the unfortunate circumstance that that work

was issued practically by three or four men, instead of representing the whole profession throughout the States. That was an error which would be corrected next time.

Mr. SUMNER was glad to find that this paper treated of the waste at present incurred in making the liquid extract. As had been remarked, it was almost impossible to get good calisaya bark. Those whose recollection went back some years could remember when what was called the monopoly bark was the one used generally, but now they could neither get that nor anything corresponding in quality to it. It was just possible that if they went further into the South American territory, they might be able to get bark of a similar character, but if that were not so there was no hope of getting quilled bark from South America, inasmuch as the trees had been totally destroyed in order to get at the bark in former years. At the present time it was next to impossible for any one to know how to go into the market to buy and get value received, except by analysis. The definitions seemed all altered; for what was called crown bark now was very different to what went by that name twenty years ago; that was the finest quality of the pale description, whereas now crown bark was understood to be the fine description of yellow bark. He wished that Mr. Ekin, instead of working on one description only, had treated various kinds, as he would then have given them information of what they were much in need. Large quinine makers might be able to analyse a bark before buying, but indiscriminate purchasers had not the same advantage of judging of what they were buying, and he hoped this point would not be lost sight of in the future treatment of the subject.

Mr. F. W. FLETCHER wished to ask Mr. Ekin, as the object of his process seemed to be the extraction of the total alkaloid, and especially as calisaya bark preparations were under examination, why he preferred to use spirit as a solvent, instead of chloroform, ether, or amylic alcohol. The process of treating the bark with lime and so decomposing the kinate of quinine was first proposed by Carles, and he recommended chloroform. If percolation was used, the chloroform came through as a nearly colourless liquid, and if this were agitated with dilute acid the whole of the alkaloid passed into the acid solution. On separating the acid solution, and treating it with an excess of ammonia, the alkaloids could be extracted by Allen's ether process, and thus the long process of distillation to recover the spirit was avoided. Of course this method would not answer if it were desired to separate the cinchonidine, the cinchonine, and the amorphous alkaloid; but where the object

seemed to be to get the total alkaloid in a comparatively rough way, he should certainly think that chloroform or ether would be a preferable solvent.

Mr. WILLIAMS said the most important point brought out was the difference in the yield of alkaloid from the same bark when treated in different ways. In the fluid extract form in which the smallest quantity was produced a considerable amount of evaporation was required, and possibly the alkaloid was decomposed by oxidation or in some other way, and probably in the subsequent concentration three-quarters of the alkaloid was lost.

Mr. BRADY said there was a practical confirmation of the thoroughly unsatisfactory nature of the Pharmacopœia process, in the fact that quinine makers were very ready to buy the residues from pharmacists after they had treated the bark for the fluid extract.

Mr. MASON said the Pharmacopœia process was a most wasteful one if the residues were not employed. He knew an instance where two serons of bark were purchased, and the residue sold for two-thirds of the original cost.

Mr. EKIN said in reply to Mr. Sumner that he could not have used different samples of bark, or the whole purpose of his examination would have been frustrated, and he could not have instituted a comparison between the solvent powers of water and spirit. He had no doubt that chloroform would be an equally good menstruum, but alcohol was certainly more convenient, adopting Dr. de Vrij's method. No doubt a small proportion of the lime was taken up by the alcohol, but it was got rid of afterwards by adding a sufficient quantity of very dilute sulphuric acid. He was surprised at the small quantity of alkaloids contained in the fluid extract, and it was gratifying to find that men of such large practical experience as Mr. Umney could corroborate his conclusions. He did not think the alkaloids were precipitated in evaporation, but that the true reason why more alkaloids were not obtained in the fluid extract had been pointed out by Mr. Umney, and this was borne out by other experiments which he had not mentioned in the paper. The richer the bark was in quinovic acid, the less alkaloids were obtained. After examining this sample of liquid extract he made another sample, or tried to do so, exhausting the bark with a good deal more water, but he found in concentrating it, that it was impossible to reduce it to the proper bulk, the sp. gr. being altogether too high. The quantity of quinovic acid in solution prevented the concentration going beyond a certain point.

Mr. GROVES asked how Mr. Ekin explained the fact that while an

infusion yielded 1·3 per cent. of alkaloids, that same infusion when evaporated into a fluid extract was reduced to ·47. The loss must be occasioned by the evaporation.

Mr. Ekin said that the infusion could not be concentrated beyond a certain point if the bark were rich in quinovic acid. A quantity of infusion representing 100 grs. could not be concentrated into 27 minims. If the exhaustion of the bark were continued according to the directions of the Pharmacopœia, "until the water ceases to dissolve anything more," long before the desired point of concentration could be arrived at a gelatinous semi-solid extract would be formed, to which the name of *fluid* extract would be inappropriate, and if the concentration were stopped when the sp. gr. was 1·2, the liquid instead of measuring 3 fluid ounces to 1 lb. of bark, would measure at least four times that quantity, and consequently 3 fluid ounces would only contain a fourth of the total quantity of alkaloids.

Mr. Umney asked if the explanation was not rather that boiling water was used in the one case and cold water in the other. Ether would not do as a solvent of the total alkaloids; it dissolved the quinine only, with a very small quantity of cinchonidine, but would not act upon the cinchonine.

Votes of thanks were passed to Mr. Ekin and Mr. Smith.

The next paper read was on—

THE EXTRACTION OF EMETIA FROM THE DEPOSIT IN VINUM IPECACUANHÆ.

By George Brownen, F.C.S.

It is not my intention to direct the attention of this Conference to the chemistry of ipecacuanha, that has been done by our secretary, Professor Attfield, and others. At the Birmingham meeting in 1865, a paper was read by Mr. Johnson, in which some of the causes at least of the instability of ipecac wine were noticed and suggestions made; yet in the revision of the Pharmacopœia after that date these suggestions were either set aside or forgotten, and the same objectionable and unsatisfactory formula is preserved by authority in the Pharmacopœia of 1867.

I do not intend to dilate on the turbid solution and unsightly deposit which continuously forms, as long perhaps as there is anything in the form of alkaloid to deposit from this wine; neither do I ask you to decide which course should be followed by the dispenser,—

filtration and consequent weakening of the wine, or the use of a turbid inelegant mixture. Ipecacuanha wine will deposit, if made according to the official formula, and that deposit will contain the most valuable and perhaps the *only* valuable constituent of ipecac root, and being mixed with the crystalline tartar adheres to the sides and bottoms of the vessels containing the wine; even if it becomes detached it is not readily or easily diffused by agitation, but is often rejected and thrown away.

Quite recently a considerable quantity of these deposits and incrustations came under my notice, and I determined to try and see if some use could not be made of this waste product.

The semi-crystalline mass was therefore made into a paste with water, and then mixed with calcined magnesia until a marked alkaline reaction was obtained. Calcic hydrate was tried, but the evolution of ammonia and other changes led me to suppose that the emetia might be affected by the lime. After standing for twenty-four hours, the mixture was slightly warmed to complete the reaction, and the resultant mixture spread in thin layers and dried as rapidly as possible at a low temperature. The mass was next reduced to powder and percolated with spirit of wine. The alkaloid associated with some impurities was thus abstracted from the other salts, and it was possibly pure enough to fortify a "weakened" ipecac wine if the necessary proportions were known. Such, however, was not my purpose. The alcohol was therefore removed by evaporation and the emetia dissolved in dilute acetic acid and then precipitated by ammonia; the emetia obtained was fawn-coloured and tolerably pure, completely soluble in acids, and precipitated by Sonnenschein's and the other alkaloidal tests.

The process I have described is an adaptation of the process of MM. Pelletier and Dumas, and by this method a considerable proportion of alkaloid may be obtained from the brown-coloured crystals and slime, which the pharmacist in his disgust is sorely tempted to throw away as a nuisance and loss.

In Watts's Dictionary, vol. ii., p. 485, under the heading "emetine," I find the following:—"The gallotannate is a white flocculent precipitate soluble in alkalies, it is *neither emetic nor poisonous*." May not this compound be formed in old ipecacuanha wine and be the cause of its uncertainty and partial inertness even when the wine was "well shaken before taken"?

No discussion followed the reading of this paper.

A vote of thanks was passed to Mr. Brownen.

The next paper read was on—

THE ADULTERATION OF DRUGS.

By Charles R. C. Tichborne, LL.D., Ph.D., F.C.S.

In considering the adulteration of drugs, three points naturally present themselves for consideration, namely, the bearing of the Adulteration Act upon this question; secondly, the bearing of the question itself upon the practice of medicine; and, lastly, the moral responsibility of the pharmacien in connection therewith.

In discussing the first of these points, I wish to confine myself to very few remarks, as it is impossible to go into the merits of that Act or Acts in the time at my disposal. Any unprejudiced observer, however, must be alive to the fact that as regards drugs and chemicals, the Adulteration Act is a failure (particularly the first), and also to the fact that in two cases out of three the analyst appointed under that Act has never received the peculiar education necessary for such a post. It requires not only considerable ordinary analytical experience, but also that rare practical training in connection with the apothecary or pharmaceutical chemist, which is generally wanting. There are exceptions to the rule as regards my remarks about competency, and Dublin and London may be instanced as notable examples of these exceptions.

There is a general notion that it is the most expensive drugs and chemicals, such as saffron, scammony, quinia, nitrate of silver, etc., that are commonly adulterated. There are, no doubt, many such cases, but as details of these examples would be more than twice-told tales, it is not my intention to weary you by repeating them.

In the following examples, however, I wish to bring before you a few adulterations which I have picked up lately in the course of my experience. They are in a degree typical, and also illustrate the fact that adulteration is perhaps even more extensively carried on amongst cheap drugs than dear ones. I have been informed on good authority that powdered hematite (red iron ore) is frequently sold as the peroxide of iron. It is still a favourite remedy, particularly among amateur doctors, and as the pharmacopœial article is only worth a few pence per lb., a variable rock with various proportions of oxide of iron (10 to 70 per cent.) should not be substituted for it; I am not, however, prepared to vouch for the correctness of this statement from actual observation, but the instances I am now about to mention are some that have come under my own immediate notice, and which I am now in a position to put before you.

Phosphorus and nitric acid are not very dear substances, and therefore we would suppose that a preparation like phosphoric acid would always be made as directed from those chemicals, particularly when sold as the British Pharmacopœial acid. But I place before you a specimen of the so-called B. P. acid, which is made from bone ash and oil of vitriol. On reference to Watts's "Dictionary of Chemistry," vol. iv., pp. 500–544, it is therein stated that a very pure acid may be obtained by treating bone ash with oil of vitrol; that is to say, by repeatedly treating with H_2SO_4, evaporating and other details of manipulation, not necessary to specify in this paper. The writer says, after describing the process, "the filtrate when boiled constitutes a solution of orthophosphoric acid contaminated with a trace of sodium, but otherwise pure." Now, whether it is possible to remove the whole of the lime and magnesia by easy and cheap means, I am not prepared to say. It is evident that by treating the bone phosphate directly by sulphuric acid the first stage is to remove only two-thirds of the calcium, as is evidenced by the following equation :—

$$Ca_3(PO_4)_2 + 2H_2SO_4 = CaH_4(PO_4)_2 + 2CaSO_4.$$

As far as I can see the sample of so-called phosphoric acid under examination is very little removed from the acid solution represented by the above equation, and more exactly represents the biphosphate of lime of the manure makers than the pharmacopœial acid. It gave a voluminous precipitate on adding chloride of ammonium and carbonate of ammonia, and also contained appreciable quantities of magnesium. Here we have a chemical product, cheap in itself, cheap as regards the sources from which it is procured, and yet, "it shall not escape calumny." The doctor's dose, thirty drops, is not much, but for the sake of commercial greed it must be cheapened.

Linseed is a very cheap commodity, owing partially to the extensive cultivation of the plant for flax and other purposes, and also because as regards the seeds we utilize the whole of the residue after expressing the oil. After getting the latter valuable product, we have the linseed cake, which is valuable as a cattle feeder. This again, when ground, is prized by the medical man for its emollient properties. Well may the plant be called *linum usitatissimum*. Of such universal application is this substance that it becomes important that we should have it extremely pure and free from extraneous matter. Yet even the cheapness of this commodity has not saved it from the adulterator's hands. Extensively as the linseed is pressed

for oil, grapes are much more extensively pressed for wine, and unfortunately the vinegrower cannot utilize the residue of his wine-press except for manuring his vineyard, therefore the winepress residue may be practically considered as a dead loss; but some ingenious winepresser bethought himself that as he had a press, it was only necessary to add a little linseed farina to grape residues to produce a very presentable linseed cake, as far as the eye went. I show you now specimens of linseed cake manufactured abroad, in which the residue of the grape stones and stalks can be easily recognised by using a low power on the microscope.

I was rather amused by a late number of the *Pharmaceutical Journal* calling attention to a paragraph in the *World* of July 31st. The writer in the *World* points out that the well-known drug colocynth is an indigenous Cyprian plant and imported at a shilling a pound. "No wonder," he says, "apothecaries and chemists make fortunes, when we see what we have to pay for a few pills, containing a few grains of it." Now, like all gentlemen who go out of their sphere, he makes a miss of it. He is evidently innocent of the fact that of the five ingredients of the pill he has pitched upon one of the cheapest, whilst it contains double the quantity of scammony, a very expensive drug. The writer having been so successful in finding the word colocynth in some encyclopædia, comes to grief in the Pharmacopœia. He has got from the shoe latchet to Appelles' legs. *Ne sutor ultra crepidam.*

How much more surprised would he be to hear that the wonderful drug that costs so little is extremely difficult to procure in commerce in a state of purity, if we are to take the Pharmacopœia as a standard. The official part of the colocynth is, as expressed in the Pharmacopœia, "the dried decorticated fruit, freed from seeds."

Now, we have in commerce three articles, none of which represent the colocynth of the Pharmacopœia. The colocynth apple may be anatomized into the rind, pulp, and seeds. Although Pereira says, "that the seeds are bitter as found in commerce, and that a scruple will act upon a dog," this bitterness is only skin deep, and is more strikingly observed in the dry pulp than in the fresh fruit, the seeds of which are stated to be an article of food in North Africa. The albumen of the seed is perfectly tasteless; if we wash the seed for some time and then try it, we shall find that the seed is nearly free from bitterness, and *ergo*, the seed contains no colocynthin. These remarks also apply to the rind, although in a somewhat less degree. Therefore I maintain that as these parts are inert, it is as much an adulteration to sell such an article for the medicinal powder as a

direct adulteration with starch would be. It is another method of lowering the price at the expense of quality, and constitutes a system adopted in more drugs than *pulv. colocynthidis.*

I have carefully anatomized a colocynth apple, and find that it consists of—

Seeds (inert)	47·19 per cent.
Rind (nearly inert) . . .	33·78 ,,
Pulp	19·03 ,,
	100·00

So that if we take Meissner's analysis, which states that colocynth pulp only contains 14 per cent. of colocynthin, we shall be astonished at the small amount of colocynthin in some commercial samples.

	Per cent. of Active Principle.
Pure Sample	14·3
Turkey Pulp ground without removing the seeds	4·2
Colocynth ground with rind and seeds . .	2·6

In a substance in which the medical man depends upon a dose of 2 to 8 grains, this presents a wonderful range of active principle, from 14 per cent. to $2\frac{1}{2}$ per cent.

The samples exhibited to this meeting were all in commerce, one is a sample of the very best average quality, but still containing a very large proportion of seed; in fact, it is very seldom without indications of the presence of that substance, and I believe it is generally the practice to powder the colocynth pulp with the seeds remaining in it.

The second sample is one which is much darker in colour, and consists of the whole colocynth apple ground.

The third sample is not only the whole colocynth ground up, but a sufficient quantity of potato starch added to make the colour right, a very profitable transaction. A medical man prescribing 8 grains of such a powder would be disappointed in the results.

The second point of the adulteration question, viz., its bearing upon the practice of medicine, has been indirectly touched upon, and is perhaps more strikingly viewed from the consideration of the adulteration of very active drugs, such as opium, chloral hydrate, etc. We all know the acknowledged superiority of the English made alkaloids over the foreign. Some time since I had to perform experiments, pathologically and otherwise, with atropia. The English

specimen (specially manufactured by Messrs. Hopkin & Williams) proved itself at the lowest computation six times as strong as the German. How is the physician to regulate his dose in such a case, where one-fiftieth part of a grain will produce a marked result?

As regards the moral responsibility, I wish most emphatically to express my conviction that the control of drug adulteration must come from the pharmaceutical chemist himself. In time, the public analysts must be selected from this body, and if he once realizes his great responsibility, and it is a very great responsibility, he will be able to control the manufacturer. He is much more than an ordinary trader. He has been declared to have an education outside the "three R's," and outside his buying and selling. This in itself is a responsibility. If he says I must have a colocynth which represents 14 per cent. of active matter, get it how you like, the manufacturer or powderer will supply it. He, the pharmacien, will satisfy the doctor, the public in years to come will learn to appreciate him, and, above all, he will satisfy his own conscience.

"Nought's had, all's spent,
Where our desire is got without content."

The PRESIDENT said this paper was very valuable, especially as it showed how adulterations occurred in articles of low commercial value. Pharmacists were apt to imagine that it was only the more valuable and rare products which need be examined, but this paper showed that they must look a little more widely for contaminations.

Mr. SIEBOLD, referring to the instance mentioned, in which phosphoric acid sold as the officinal article was found to contain so large an amount of lime, said from his own experience he could not but regard such a case as quite an exceptional one. It was not, however, a rare occurrence to find a minute trace of lime in commercial specimens of the B.P. acid, and its presence showed that a good deal of that acid was still made from bone ash or some other form of calcium phosphate. But it by no means followed that phosphoric acid made in that way must contain much lime, or indeed any appreciable quantity of it. It was true enough that if the bone ash and sulphuric acid were used in the relative proportions indicated by Dr. Tichborne's equation, the resulting preparation would contain one-third of the lime present in the bone ash operated upon; but such a preparation was not phosphoric acid at all, but acid calcium phosphate. Manufacturers of phosphoric acid used a larger proportion of sulphuric acid, in fact, just sufficient to

decompose the acid calcium phosphate; and the precipitation of the calcium as sulphate was rendered complete by the addition of alcohol, which was subsequently expelled again by evaporation. This acid thus prepared was practically free from lime, and if pure sulphuric acid was used in the process, it would also be free from arsenic, an impurity which nearly always occurred in the acid prepared from phosphorus, from which it was difficult to remove. In the case of most of the officinal chemicals, he thought it did not matter by what process they were obtained, so long as they stood the tests of the Pharmacopœia. With regard to the adulteration of drugs, he did not believe that such cases as those just brought before the meeting were at all frequent. No one willing to pay a fair price for his goods would have the slightest difficulty in obtaining good and pure drugs. He could at once call to mind more than a dozen wholesale firms from whom he could purchase drugs of unexceptionable quality, but he should not know where to apply for adulterated articles such as had just been described. He should find it much easier to obtain pure than to procure adulterated drugs. He made these remarks because he was anxious that those present who were not chemists, and especially medical men, should understand that the instances of adulteration brought under their notice by Dr. Tichborne did not represent the rule, but were rare and isolated exceptions, against which any chemist and druggist with a knowledge of his business would know how to guard. He cordially agreed with Dr. Tichborne as to the necessity of public analysts possessing a proper knowledge of drugs.

Mr. Mason said Professor Tichborne seemed to be of opinion that the Adulteration Act had not at all affected drugs or chemicals, but his own opinion was that it had had a most salutary effect, because it had obliged the wholesale manufacturers to label all their articles correctly, and thus prevented business competition going too far. As far as the adulteration of drugs was concerned, he must say he rather agreed with Mr. Siebold. If people wanted pure colocynth they could have it; but if chemists and druggists would have an article not pure, it must be provided.

Mr. Long thought the paper was very valuable in putting chemists and druggists on their guard. He feared they had fallen on degenerate days, when falling prices were recouped by adulteration of the article sold. A short time ago there was a most determined effort to have the very best things, but he was sorry to say that on account of the present state of the drug trade there were a lot of inferior pettifogging men come into it, who, he was afraid, would sell any-

thing, and they brought a most injurious competition to bear on more respectable tradesmen.

Mr. WILLIAMS could not agree with the remarks of Mr. Siebold, respecting the phosphoric acid made from bones. He did not think it was possible to so purify the acid made from bones by any means with which he was acquainted, as to bring it up to the point he should consider suited for medicinal purposes, especially for the preparation of the various syrups. The difference was soon discovered between an acid containing only what Mr. Siebold called a trace of lime, and a pure acid. He believed it was perfectly possible to get phosphoric acid without any trace of lime at all. But not so easy to separate a more injurious ingredient, namely, magnesia. Lime was frequently employed in syrups, but magnesia appeared to be fatal to the keeping properties of any syrups. He was not before aware that hematite was ever sold as the medicinal hydrated oxide of iron of the Pharmacopœia, though he knew that iron forge scales were sometimes ground and sold as magnetic oxide of iron, which was a very improper thing to do, because they were not so soluble. With respect to atropine, the German makers said the English did not know how to make atropine, but only made belladonnine, whilst they made real atropine. It was, therefore, according to them, a question whether English manufacturers made atropine at all; but as the article of English manufacture seemed to have satisfied Professor Tichborne, he (Mr. Williams) thought they might be contented.

Mr. UMNEY said reference had been made to an article published in some of the daily papers since the annexation of Cyprus that colocynth was sold here at 1*s.* per lb. That was an error, it should have been 1*s.* 9*d.* In the London market the drug known as Turkey colocynth came invariably in a peeled and not in an unpeeled state; for years, indeed, he had not seen unpeeled Turkey colocynth. Occasionally they saw unpeeled Mogador colocynth; but it was rare. He ventured to say if the majority of the wholesale drug lists were searched, colocynth would be found quoted first of all as colocynth itself, then as colocynth powder, and finally as colocynth pulp. There was no mystery about the matter. As to the manufacture of the extract, Professor Tichborne had spoken of the seeds being used with the colocynth in making extract. But colocynth seeds contained about 50 per cent. of fixed oil, and the manufacturer would avoid these as much as possible. In making an extract with an alcoholic menstruum no one could succeed properly (unless he wanted to get oil in his residue), without he rejected the seeds

almost entirely. He had seen instances where a few seeds were left behind, in which the small portion of oil thus remaining would contaminate the simple extract, and in endeavouring to make a compound extract a satisfactory powder could not be obtained from it. Then again with regard to potato starch. They did not know very much about potato starch on the other side of the Channel, but he must uphold the honour and integrity of drug grinding on the other side of the Channel by saying that, as far as his experience went, potato starch was not used or even dreamed of. As for phosphoric acid, his own idea was that 90 per cent., probably, was neither made from bone ash nor yet by the Pharmacopœia process, but by a combustion of phosphorus under bell jars. And if there were any additional amount of oxygen required, it was finished off with nitric acid. He knew of factories where serious mishaps had occurred whilst this combustion of phosphorus was being carried on under large earthenware vessels. One could not dispute the occasional adulteration of saffron. The late Daniel Hanbury pointed out that saffron was adulterated. They dressed it abroad, and it could be obtained at any price. The dressing consisted in treating it with some adhesive body, such as glycerin, containing carbonate of baryta or lime. If a small quantity were taken, and infused, a white powder was thrown down, and on removing the infusion, and treating the residue with hydrochloric acid effervescence took place, and the alkaline base could be most easily identified. One could understand that even 5 per cent. of such adulteration would very materially cheapen the price, but these things were few and far between with fine Valencia saffron. Scammony was adulterated, but it was done on the other side; scarcely a single parcel could be found which did not contain starch in some degree. He had found 2, 3, and 4 per cent. of starch in the finest scammony, which would assay over 80 per cent. of resin, and when found, it was very difficult to convince any one that it was genuine scammony. It was a fact that scammony resin is made here, and sent abroad to be mixed with low quality natural scammony, to come back to this country as fine scammony.

Dr. Symes could not think that pharmaceutical or public morality had fallen to the low ebb attempted to be proven by Professor Tichborne's paper, and the discussion which followed from it. His opinion was that drugs and chemicals were never to be obtained in so great a state of purity as in the present day. He was quite convinced that if Professor Tichborne sought for adulterated articles he could find them, but he did not believe the sample of dilute

phosphoric acid was a fair specimen of the article as usually found. He was quite satisfied that bringing forward these articles did good, but this sample had, in his opinion, been sought for as a bad sample, as an article which was to be found rather than the average article in the market. He had found in dilute phosphoric acid traces of dilute nitric acid, as if the final heating had not been sufficient to drive off the nitric acid. With regard to linseed there had been within the last few years a competition amongst manufacturers as to which could produce the best, not the worst, linseed meal, and he could now obtain linseed flour in which a large proportion of the husk was removed at a considerable cost to the manufacturer. He scarcely thought any of this cake would be found in the linseed meal of commerce; no doubt it might be imported for feeding cattle, but as pharmacists they had little to do with that matter. In making extract of colocynth, no one having regard for the product would attempt to use a powder containing seeds.

Dr. MacSwiney was anxious to express his opinion of the great value of the paper read by Professor Tichborne. The discussion which had taken place testified unmistakably to the importance of this subject to the gentlemen who composed the Conference, and he would venture to call attention to its serious bearing from the point of view of a practising physician. He need scarcely point out how essential it was that the physician should have at his command pure drugs. It would be waste of time to expend any argument to show how important it was on the one hand that the drugs should not be deficient in their characteristic energy and activity; and on the other hand, that there should not be such a disparity between one sample and another of what purported to be the same substance, that a dose of one being useful, the same dose of another should be disastrous or even fatal. While it was highly interesting to pharmaceutical chemists to ascertain how it was and why it was that drugs were more or less adulterated, the medical man had not much to say to that particular inquiry. He required pure drugs for the treatment and cure of his patients, and it was in the highest degree desirable that means should be taken by such an important body as the present that the practitioner should be able to depend on the purity of the drugs he prescribed. They had listened with interest to the explanation of how it happened that contaminations crept in, and from a pharmacist's point of view that was of great importance and interest, but as he would remark again, from a medical practitioner's point of view, that was entirely outside the question. He wanted pure drugs, and when he prescribed them he certainly was

greatly disappointed, and his patients were frequently the sufferers, from the presence of these adulterations, or contaminations, in whatever way their presence might be explained. It was within the cognizance of every practising physician that several drugs often did not produce the effects which were to be expected; neither astringents, nor hypnotics, nor purgatives, nor sedatives would always act invariably as they might be expected to do. He of course excepted idiosyncracies with which the physician would know how to deal. Thus in the matter of opium or chloral hydrate, or iodide of potassium, or various purgatives, or that class of remedies to which citrate of iron and quinine belonged, the physician concluded, often with very good grounds, that he could not rely on the drug being pure. He had listened with great interest to the views the Conference entertained with regard to analysts. He was not competent to offer an opinion whether the ordinary analyst elected under the Adulteration Act did or did not perform his duty effectively. But one thing appeared certain, that there should be in every large drug establishment, a careful, constant, and reliable analysis of each sample of drugs sent out, to be ultimately used by the physician for administration to human beings. How much more important was it that the powerful drugs administered to human beings should be pure than that they should have an explanation of the mode in which the impurity happened to creep in. In private practice they often saw what he had pointed out, and in hospital practice, speaking generally, he believed it was also very noticeable. He had the advantage of being an hospital physician, and he must say he had not much confidence in a number of the drugs which may sometimes be met with as supplied to this class of public institutions. He was not competent, and if he were he had not the time, to analyse the drugs, but that these drugs should be analysed and their purity guaranteed every right-minded man would admit. An inspection of the list of prices of the drugs sent to the hospitals he thought clearly explained why they could not be of such a quality of purity as would be desirable. First of all he found the drugs were quoted at prices very much under those which respectable druggists would sell them at; and next, there was the greatest variety in some articles, one, two, and three varieties at very different prices; he must naturally conclude from that that all the specimens were not pure, and he might perhaps be permitted to doubt whether they were.

Professor MARKOE said that one very common source of inorganic impurities, such as calcium and magnesium salts in phosphoric acid,

was the vessels in which the analyses were made. It was impossible to get the best porcelain dishes that would not have the enamel and even some of the ware taken in solution when the syrup of phosphoric acid was heated to 400° F. So that it was impossible to follow the process of the United States or British Pharmacopœia without getting a trace of some of these contaminations unless platinum were used. The removal of arsenic was exceedingly difficult, and he was sorry to say he had never been able to get a sample of English phosphorus but what contained an enormous quantity of arsenic. In fact it was often more difficult to get rid of all the arsenic than to make the phosphorus in the first place. He had worked up several hundred pounds of phosphorus into acid, and the removal of the arsenic was the most troublesome part of the process. Allusion had been made to making extract of colocynth from the whole colocynth, and he noticed that the B.P. did not include the simple extract. The United States Pharmacopœia did, and it was his practice to make that simple extract from the whole apple, taking care not to powder it, but simply crushing it without breaking the seed. Acting in this way none of the fixed oil went into the solution, because it was insoluble in dilute alcohol. If, however, the drug was ground, then the fixed oil would be more or less removed. He might back up that statement by the authority of Dr. Squibb. He thought it would be a better practice to make simple extract of colocynth, and then dry the powder and pound it with aloes and scammony, thus doing away with the necessity of powdering the drug, and simplifying the operation in every way.

Mr. Boileau said the paper was a valuable one, as it would incite young pharmacists to keep only pure drugs. But as a partner in one of the oldest houses in that city, he could not sit quiet when he heard such terrible aspersions made on the Dublin drug grinders. He had seen drugs supplied by a great many Dublin houses, and had never seen them adulterated. There might be one drug superior to another, as in the case of powdered rhubarb, where there were three or four qualities, but the cheaper were not adulterated. With regard to colocynth, he quite agreed with Mr. Umney. With regard to saffron, the article imported from Alicante was invariably adulterated, and could not be sold in this country owing to the Adulteration Act; but that from Valencia was not adulterated. It had lately been attempted to adulterate it with the stamens of the *Calendula arvensis*, but he had not seen any specimens. Dr. MacSwiney drew his conclusions from the matter of price. But there was no proof, because the price was lowered through competition

that an adulterated article was sold; it might be that the seller was content with less profit. As Dr. MacSwiney had said, he had not the time and might not be competent to test drugs, and it was not often that medical men in that country were competent, because they really had not the time; the testing of drugs was a science in itself. It was the medical men throughout the country who cut up prices; not gentlemen in Dr. MacSwiney's position, but the general practitioners; they would buy a cheap article, and the men who wished to supply only the best article had very little chance. With regard to scammony, he was not aware that he had ever seen pure scammony yet. He had seen it analyse 80 per cent. of resin, but he had never seen pure virgin scammony. The price varied from 20*s.* a lb. to 48*s.* and 50*s.*, but price should not be a consideration in drugs. If people did not want a cheap thing it would not be produced, and it was the public who were to blame, not the druggists.

The discussion was here adjourned until after luncheon. Upon it being resumed—

Mr. GREENISH said it would be recollected by those who attended the Conference in Edinburgh, in 1871, that he there read a paper on "Pulvis Lini," where he pointed out that much of the linseed meal found in druggists' shops was made from the linseed cake, and that in that cake there was a great quantity of cruciferous seeds, and that it was not at all suitable as a representative of the linseed meal of the Pharmacopœia. Since that he had occasionally examined samples from different parts of England, and at the present time there was no difficulty whatever in getting linseed meal corresponding with that of the B.P., and without cruciferous seeds. Another article mentioned by Dr. Tichborne was colocynth. He had spent some time over this article, and found that of a great many samples examined very few indeed contained starch, and the quantity in those was very small, in fact he could scarcely say that it should be considered an adulteration. There was no difficulty whatever, if it were examined under the microscope, in determining whether the outer rind were present or not. If a small quantity were placed in a solution of potash and gently warmed there would be found the flattened cells peculiar to the outer rind. With regard to the seed, they contained no starch, and, however small the proportion of seed in the pulp—and it was a most difficult thing to deprive the pulp of all its seed—their presence could be determined under the microscope by a solution of potash used in the same manner, because on the surface of the seed would be found a

peculiar and beautiful stellate cell. With regard to saffron, it was sometimes met with very much broken up, but he had found the pollen grains differed so essentially from those of calendula that there was no difficulty in detecting the latter under the microscope. He thought the subject as brought forward had been somewhat exaggerated; and so far as Great Britain was concerned was a thing of the past; but while every pharmacist should avoid the least appearance of evil, it was also his duty to preserve his fellow members from any undue aspersions, and the public from exaggerated ideas of the adulteration of drugs.

Mr. PAYNE said there was one point very important to clear up in this interesting paper. It had taken him by surprise that there should be so many adulterated articles obtainable, and he should like to know whether Professor Tichborne had used any special means to obtain these substances he had analysed, or whether they were offered to him in the ordinary course of business.

Mr. COTTRILL said he was about to put the very same question. He should like to know, without mentioning names, the source whence these things came. He did not think it was possible to get drugs to any extent impure in any pharmacy in the kingdom. He could name numberless London houses where, if they sent out a parcel of drugs, the ticket upon it was a guarantee of their genuineness. Possibly Professor Tichborne had been searching for impure drugs, as Diogenes with his lantern for an honest man, but he did not think in any respectable establishment he would find them. The fault lay in another direction. There were many persons throughout the country, particularly in the West of England, who had no legal and consequently no educational qualification, and did not know good drugs from bad. They sold things wholesale and retail, and dispensed physicians' prescriptions, but the only test they had of drugs was the price list. He also considered the Government was very much to blame. In the way contracts were taken for prisons, for instance, a list was sent out like a wholesale druggist's price list, containing innumerable drugs, the prices being all fixed, and a lower price than he thought he could find any house in London would supply them at. You were informed that you could tender either net, at a percentage premium, or discount. He tendered for one prison, as he thought the supply would not be very great, and was informed that the contract was accepted by a London house at 10 per cent. discount. The imperial powers in London allowed and countenanced that which ought not to be. Again he was told that in that country contracts were taken by the

guardians for drugs at prices that made him think that the drugs could not be fit for pigs to take. It was not so much, therefore, the pharmacists, but the public and the imperial powers who were to blame. On the one hand the druggists were tied down by analysts, and on the other forced to sell at prices that pure drugs could not be obtained for.

Mr. CONYNGHAM remarked that Dr. MacSwiney had said he could not find pure drugs in the public institutions he visited. If such was the case, he considered it was the fault of those having charge of the institutions, who would not give the price of the best articles. But he could corroborate Mr. Boileau, who said they were not supplied with impure drugs, but inferior drugs. In the north of Ireland there was an union supplied with drugs, and a gentleman belonging to the board complained of the very second and third class quality. He produced the list and asked a gentleman if he could supply pure drugs at those prices. He said no, but if he would give him a wholesale list from a London house with 10 per cent. upon it, he would supply them with pure drugs. They acted on that suggestion, and there had not been a single complaint since.

The PRESIDENT said he had been very glad to hear the remarks which had been made, but he would suggest that the discussion should not take the direction of pharmaceutical ethics or politics.

Mr. HOLMES said he held the office of dispenser to one of the dispensaries in Dublin, and the drugs could not be better than those used there.

Mr. FRAZER remarked in reference to Professor Tichborne's suggestion that public analysts should be trained druggists, that it would be very difficult to get men competent for the purpose who would give up their present positions. He could see many gentlemen around him thoroughly competent, but it would not be worth their while to become public analysts. They had had a few gentlemen connected with the Pharmaceutical Society who were appointed public analysts, and some of them had retired from business in order to give their undivided attention to their new and responsible duties. By and by the Government would have a larger field from which to make a selection, and then perhaps they would see a better state of things. With regard to the purity of articles, Mr. Mason said the public were to blame, because they would have a cheap article. His reply was, do not give the public a cheap article. If they did not keep impure articles the public could not get them; and with regard to competition he would say, compete on a high

level and not on a low level. He would insist on every man selling a good article, and getting a fair price for it.

Professor TICHBORNE, in reply, said it was not necessary to contradict the indefinite trade statements which had been introduced into the discussion. He had nothing to do with them. His object was merely to bring before the Conference some facts, and how he got hold of them he would explain. He was rather surprised and sorry to see the tone that a great number of gentlemen who were connected with manufactures had taken in this discussion. They knew perfectly well that there were good drugs in the market and bad drugs, but every gentleman who got up indignantly repudiated these matters, and ended by acknowledging that every one of them was correct. Thus Mr. Siebold described a process by which this phosphoric acid was made from bone ash. He maintained that when phosphoric acid was supplied labelled B.P. it ought to have been made from phosphorus and nitric acid. Except in one case, and that was to confirm an experiment of his own, he had not bought a single sample; they were transmitted to him in the ordinary course of business and offered on the market. There were many other cases he had not mentioned. For instance, it was not long ago he got one of these ordinary samples, which were sent out as an inducement to buy, in a little wooden box, by a house in London, marked "pure pepsine," containing 80 per cent. of sugar of milk. With regard to the excuses that the public craving for cheapness had induced this adulteration, it was true that might have done something; but how about the competition of traders? If you told the persons you were selling it to that linseed meal is half of it grape refuse, would they buy it, however cheap it might be? He was rather surprised to find from a remark of Mr. Williams that magnetic oxide was frequently sold made from the refuse of blacksmiths' shops, and that showed the advantage of bringing forward this subject, as it elicited further information which could be used with discretion by pharmacists. This was another striking instance of what he had tried to prove, that adulteration was not confined to the dearer articles. Some time ago he examined a sample of capsicum which contained only twenty-five parts of red pepper, the other being common salt. That was an article which was cheap enough to be sold fairly, and the consumption was not very heavy. One gentleman said it could not be the fact that colocynth was adulterated; the next said it was a very well-known fact that whole colocynth powder was always on the wholesale lists. His only object in touching on this subject was to show that colo-

cynth so marked on the drug list was not the proper colocynth to use, inasmuch as it only contained 2 per cent. of the active principle, while the real thing contained 14. If it appeared fifty times on a list it would not make it right or increase the percentage of colocynthin. He did not suppose that one in twenty who used it were aware of the difference in the quality. One gentleman made a remark that all the potato starch was made in Ireland, but it so happened there was not a particle of potato starch made there; the only starches made in Ireland were wheat and rice; the whole of the potato starch was manufactured in England, the two made there being wheat and rice, but chiefly the latter. Somehow or other the question of the extract of colocynth had crept into the discussion, but he never said anything about the extract. What he dwelt upon was the fact that when a man sent colocynth to the drug mill he did not remove the seed. With regard to druggists as analysts, he merely introduced that question to point out that public analysts required an experience, and there were some excellent men amongst their number; but they required, besides actual reading and school education, an experience which was better got, in his opinion, under the tuition of an apothecary or a pharmacist than anywhere else. He did not believe that an intimate knowledge of drugs was to be got in a public chemical school. In conclusion, he might remark that if they were to try to find excuses for this adulteration, which seemed to have been the tendency of the discussion, it was rather an acknowledgment of a leaning to immorality. If the laws of the country were wrong, that was another matter; and if they were wrong, they should get them altered.

The PRESIDENT, in proposing a vote of thanks to Professor Tichborne, said he thought he had slightly misapprehended the tone of some of the remarks. The course of events was somewhat in this way. Certain charges of adulteration were thrown out, and a medical gentleman seemed to infer that those adulterations were general, and upon that assumption founded an argument that pharmacists were to be blamed in the matter. On the other hand, it was contended that these cases of adulteration were more exceptional than general, and that, as a rule, pharmacists were open to but little blame in such matters. During the adjournment he had explained to Dr. MacSwiney that however the case stood with regard to adulteration or contamination in some of the materials they employed, one thing was indisputable, that the whole history of the British Pharmaceutical Conference went to show that their efforts had been mainly directed to the discovery and prevention of

these contaminations, and this he was happy to say Dr. MacSwiney freely admitted.

A vote of thanks was passed to Professor Tichborne.

The next paper read was entitled—

THE DISTINCTIVE TESTS FOR CARBOLIC ACID, CRESYLIC ACID, AND CREASOTE.

By Alfred H. Allen.

Several previous observers have devised methods of distinguishing carbolic acid from wood-tar creasote, and have described tests which when applied to the pure substances leave little to be desired.

It appears, however, not to have been observed that cresylic acid, so largely present in the commoner kinds of carbolic acid, resembles creasote more closely than pure carbolic acid does, and fails altogether to respond to some of the tests which have been proposed to distinguish carbolic acid from creasote. As the substitution of coal-tar acids for wood-tar creasote is pretty certain to be made by the employment of a crude variety of carbolic acid, the presence in it of cresylic acid cannot rightly be ignored.

With a view to clearing up the discrepancies between the results recorded by other observers, and of ascertaining the most reliable tests for distinguishing carbolic and cresylic acids from wood-tar creasote, I have instituted a series of special experiments.

As the origin of some of the statements made by other observers cannot be traced, owing to imperfect descriptions of the substances on which they worked, I think it well to define carefully the exact substances on which my own experiments were made.

The *Carbolic Acid* was a sample of Calvert's No. 1 for internal use; boiling point 182° C.

The *Cresylic Acid* I prepared by fractional distillation of Calvert's No. 5 carbolic acid. The portion coming over between 125° and 205° C. was collected separately and again distilled, the first and last portions being rejected. The cresylic acid thus obtained boiled chiefly at about 197° C., but another smaller fraction boiled at 203° C.

I believe this difference is due to the presence of two isomeric cresols in coal-tar, having slightly different boiling points. Many of the experiments were made separately on both fractions, but without the least further difference in their properties becoming

apparent. The distillations were conducted in an atmosphere of coal-gas.

The *Creasote* was a sample of Morson's wood-tar creasote. It boiled at 217° C., and so probably consisted chiefly of creasol, as guaiacol boils at 200° C.*

It was pointed out by Calvert many years ago that carbolic acid formed a crystalline hydrate, of the composition $C_6 H_6 O$, $H_2 O$, which fused at 17° C. This fact is usually ignored by the bookmakers though well known to carbolic acid manufacturers. This hydrate would contain 16·07 per cent. of water. When water is gradually added to carbolic acid with repeated shaking, the crystals become liquefied, and at length a portion remains at the surface.

In order to ascertain how much water carbolic acid would take up, about 13 grams of the crystallized acid were melted and boiled for a minute or two in a small weighed test-tube to drive off traces of water. After cooling the whole was weighed.* Cold water was then added gradually with repeated shaking until about ·2 c.c. remained as a layer on the surface of the liquefied acid. This was then removed by cautious use of wet blotting paper, and the residual carbolic acid weighed. 9·190 grams were found to have increased to 12·527, which gives 26·6 per cent. as the proportion of water in the liquid acid. On repeating the experiment a liquid acid containing 27·0 per cent. of water was obtained. This fact is of importance as showing that carbolic acid will take up far more water than is commonly supposed. The proportion is also of interest, as it corresponds pretty closely to the formula $C_6 H_6 O$, $2 H_2 O$.†

Hence the liquid acid may be regarded as a definite hydrate of phenol, but the fact that warm carbolic acid will take up a larger proportion of water than the above, and that the water is entirely separated by agitation with benzol, is against this supposition.

On trying a similar experiment with cresylic acid I found that the water absorbed amounted to 13 per cent. of the hydrated acid. On repetition the product contained 14 per cent.

$C_7 H_8 O$, $H_2 O$ requires 12·7 per cent. of water.

In the subsequent experiments, when mention is made of hydrous carbolic or cresylic acid, the products obtained as above are to be understood.

1. *Action of Cold.*—Absolute carbolic acid is solid at ordinary temperatures, and the hydrous substance solidifies in a freezing

* According to some observers, at 210° C.

† The theoretical proportion of water in this compound would be 27·69 per cent.

mixture of hydrochloric acid and crystallized sulphate of sodium. Neither absolute nor hydrous cresylic acid, nor creasote, shows any signs of freezing on exposure to the same degree of cold.

2. *Solubility in Water.*—Twenty c.c. of water at about 170° C., dissolved 1·8 c.c. of hydrous carbolic acid. This corresponds to a solubility of one volume in 11·1 of water. Hence the saturated aqueous solution contains 8·56 per cent. by weight of the absolute acid corresponding to a solubility of one part by weight of absolute acid in 10·7 parts of water. This is a far greater solubility than is generally attributed to carbolic acid, the discrepancy being probably due to an impure acid being generally used. In hot water carbolic acid is still more soluble.

Hydrous cresylic acid dissolves in about 29 measures of water at about 20° C., which represents a solubility of one part by weight of absolute cresylic acid in about 31 parts of water.

3. *Solubility at* 15·5° C. (= 60° F.) *in solution of Caustic Soda containing* 6* *per cent. of* Na H O.—Absolute carbolic acid is completely soluble in an equal volume of soda solution containing 6 per cent. of pure Na H O (free from alumina). Addition of more of the alkaline solution up to 6 volumes causes no change, the liquid remaining clear. Absolute cresylic acid is insoluble in small proportions of 6 per cent. soda solution. When a large excess (9 volumes) is added, it disappears and forms distinct crystals.

Creasote is practically insoluble in 6 per cent. solution of soda.

4. *Solubility at* 15·5° C. *in solution of Caustic Soda containing* 9* *per cent. of* Na H O.—Absolute carbolic acid is soluble in an equal measure of 9 per cent. soda. On addition of any proportion of water up to 7 volumes the liquid remains clear, but is precipitated by 8 volumes of water. Carbolic acid is also soluble in 2 measures of 9 per cent. soda, and is not precipitated by less excess of the reagent than 5 or 6 measures. Absolute cresylic acid is soluble in an equal measure of 9 per cent. soda, but is precipitated when the proportion of the reagent is increased to $3\frac{1}{2}$ volumes. If to a clear mixture of equal volumes of cresylic acid and 9 per cent. soda a few drops of water be added, precipitation occurs, and when the proportion of water is increased to one volume, the original bulk of cresylic acid separates out. Hence, cresylic acid is insoluble in two measures of $4\frac{1}{2}$ per cent. soda solution.

Creasote is insoluble in any smaller quantity than two volumes

* These solutions contained respectively 94 and 91 grams of water to each 6 and 9 grams of pure caustic soda.

of 9 cent. soda. It is partially reprecipitated when the proportion of the solvent is increased to more than three and a half measures.

5. *Solubility at* 15·5° C. *in solution of Ammonia* (sp. gr. ·880).—Carbolic acid is completely and readily soluble in an equal volume of strong ammonia. The solution is not precipitated by addition of less than one and a half volumes of water. A mixture of one part of carbolic acid and three of cresylic acid is soluble in an equal measure of ammonia, but the solution is precipitated on adding even a few drops of water.

6. *Behaviour with Benzol.*—Absolute carbolic and cresylic acid and creasote are miscible with benzol in all proportions.

The hydrous substances dissolve in five volumes of benzol with complete separation of the water. Hence benzol may be used for the determination of the proportion of water present in samples of carbolic and cresylic acid.

7. *With Chloroform, Carbon Disulphide, or Ether.*—Carbolic acid, cresylic acid, and creasote react in much the same manner as with benzol. Agitation with 9 cent. soda removes them from their solutions in the above solvents.

8. *Behaviour with Petroleum Spirit of sp. gr.* ·669 (*Commercial "Benzoline"*).—Absolute carbolic acid dissolves half its volume of petroleum spirit, forming a clear liquid. On addition of a larger portion of petroleum spirit precipitation occurs.

With one volume of carbolic acid and three of petroleum spirit the layers have about the same measures as the original liquid. Each layer, however, contains both liquids, as may be proved by cooling the tube with a freezing mixture (or by wrapping filter paper round it and dropping ether on the outside), when carbolic acid crytallizes out.

Absolute carbolic acid is permanently soluble in about ten measures of petroleum spirit at 15·5° C. (= 60° F.). The solubility is enormously increased by rise of temperature. Hence carbolic acid and *hot* petroleum spirit are miscible in all proportions. On the other hand, by cooling with a freezing mixture the carbolic acid is almost wholly deposited.

If the cooling occurs slowly, it forms a heavy liquid layer with a portion of the petroleum spirit, but by rapid cooling the carbolic acid is deposited in long crystalline needles which render the liquid semi-solid.*

* Crystallized carbolic acid may be used for distinguishing between coal-tar benzol and petroleum spirit. In the latter it is sparingly soluble, and is re-

Hydrous carbolic acid is almost insoluble in moderate quantities of cold petroleum spirit, which liquid does not separate the contained water from it. (Another difference between benzol and petroleum spirit.) Absolute cresylic acid appears to be miscible with petroleum spirit in all proportions.

No separation, either of crystals or liquid, occurs by exposing a solution of one measure of the acid in three of petroleum spirit to a freezing mixture.

When hydrous cresylic acid is treated with cold petroleum spirit, the volume of the former increases somewhat by dissolving a little of the spirit, but on addition of a greater volume of petroleum spirit it undergoes slight solution. It is only very sparingly soluble in petroleum spirit, requiring upwards of twenty volumes for complete solution, when the water separates. Creasote is miscible with petroleum spirit in all proportions.

9. *Behaviour with Glycerin of* 1·258 *sp. gr.*—Absolute carbolic acid is miscible with Price's glycerin in all proportions. A mixture of one volume of carbolic acid with one of glycerin is not precipitated on addition of three volumes of water. In presence of 25 per cent. of cresylic acid precipitation occurs on adding more than two volumes of water.

Absolute cresylic acid is miscible with Price's glycerin in all proportions. A mixture of one volume of glycerin and one of cresylic acid is completely precipitated by one volume of water.

Creasote is insoluble in Price's glycerin, whether it be added in the proportion of one, two, or three volumes for one of creasote. The sample of Price's glycerin used for the above experiments was found to have a density of 1·258.

10. *Behaviour with Collodion.*—Absolute carbolic or cresylic acid, when shaken with half its measure of *Collodion*, B.P., precipitates the nitrocellulose in a transparent gelatinous form, very difficult to see. It is best observed by inclining the tube and causing the liquid to flow gently from one end to the other. Creasote does not precipitate the nitrocellulose from collodion, but mixes perfectly with its ethereal solution. Addition of much creasote to a mixture of collodion and carbolic or cresylic acid causes the resolution of the precipitated nitrocellulose.

11. *Reaction with Ferric Chloride.*—The addition of one drop of a

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deposited in a crystalline state by rapid cooling. With benzol it is miscible in all proportions, the crystals of carbolic acid rapidly melting. A solution of one in three deposits no crystals by rapid cooling.

10 per cent. aqueous solution of ferric chloride to 15 c.c. of an aqueous solution of cresylic or carbolic acid causes a permanent violet-blue coloration. When creasote is similarly tested a blue colour results, which almost instantly changes to green and brownish yellow.

Other distinctive tests for creasote and carbolic acid are to be found in the books, but are almost worthless in practice. Thus the reactions with bromine, sulphuric acid, and nitric acid are far too much alike to be of service for distinguishing between these bodies. It has been stated that creasote differed from carbolic acid in its power of rotating a ray of polarized light. I redistilled a sample of Morson's creasote to obtain it colourless, and carefully tried this test, expecting to find in it a possible means of determining the creasote in a mixture, but the rotating powers of creasote proved so exceeding weak as to be quite worthless for the intended purpose, or even as a qualitative test. It is, however, quite possible that different samples of creosote may exhibit considerable differences in this respect, but if so the test is valueless for qualitative purposes, and the problem is not so much to detect wood-creasote as to recognise an admixture of the coal-tar acids. I am also unable to confirm the statement that creasote gives a solid deposit when kept for some hours at the temperature of boiling water.

I have not obtained satisfactory results by the reaction of an alkaline solution of the substances with hydrochloric acid and pine-wood, or with a solution of iodine in iodide of potassium. Sulphomolybdic acid, also, gives a blue colour alike with creasote and carbolic acid, even when the test is applied to an aqueous solution of the sample.

From the foregoing details it will be seen that in various manners carbolic acid, cresylic acid, and wood-tar creasote can be readily distinguished from each other. The case, however, is very different when we have deal with a mixture of the three substances, such as occurs in the case of a sample of creasote adulterated with crude carbolic acid. In such a case many of the tests are greatly reduced in value or rendered absolutely worthless. As the problem is to detect the coal-tar acids in presence of wood-creasote, rather than the reverse, only affirmative tests for the former bodies are of service, and in many cases these are seriously modified by the simultaneous presence of creasote. Thus, as has been pointed out by Mr. J. Williams, the ferric chloride test entirely fails to detect the presence of carbolic acid in a mixture of equal parts of that substance and creasote.

The only marked differences I have been able to observe between Morson's creasote and a mixture of equal measures of that liquid and Calvert's No. 5 carbolic acid are the following:—

When shaken with twice its bulk of 9 per cent. soda solution, pure creasote is dissolved, and remains in solution when the solvent is increased to three volumes. The *mixture* was insoluble either in two, three, or four times its volume of 9 per cent. soda. This anomalous result proved to be due to the presence of water, which reduced the strength of the soda solution. When the water was previously expelled by boiling from the mixture of crude carbolic acid and creasote, solution took place with two volumes of soda.

When shaken with Price's glycerin (sp. gr. 1·258), pure creasote remained undissolved, though the proportion of glycerin was varied from one to three volumes. The mixed creasote dissolved completely and readily in an equal measure of glycerin. The liquid was not affected by a drop or two of water, but a further addition caused precipitation. A mixture containing 25 per cent. of creasote, when shaken with an equal measure of glycerin, was not precipitated by less than one and a quarter volume of water.

Shaken with half its volume of collodion (B.P.), pure creasote dissolved to a clear liquid. The mixed creasote showed decided signs of precipitation when the liquid was allowed to run gently from one end of the tube to the other. With a mixture of two volumes of Calvert's No. 5 acid to one of creasote, the precipitation of the nitrocellulose was very marked.

As carbolic acid, cresylic acid, and creasote boil at temperatures tolerably widely apart, I thought it might be possible to effect a sufficient separation by fractional distillation to enable the tests for the coal tar acids to be more readily applied. For this purpose I introduced a mixture of No. 5 carbolic acid and Morson's creasote into a small retort, and distilled the liquid. The water, which first came over, was collected separately. The next portion of the distillate (amounting to about one-fifth of the whole bulk of the liquid) was boiled to free it from a little water, and was then tested with glycerin and with collodion. It dissolved readily in the glycerin, and precipitated half its volume of the collodion. Hence the carbolic acid of the mixed creasote was fairly detected, and there seems no reason why fractional distillation should not serve for the detection of smaller proportions of carbolic acid, as it will certainly be most abundant in the first portions of the distillate. The ferric chloride test was not found of service for testing the distillate, sufficient creasote being present to produce a decided brown coloration.

As the tests with glycerin and collodion are the only reactions of service with mixtures of carbolic acid and creasote, I did not think it necessary to apply the other tests to the distillate.

It will be seen from my experiments that the high value usually attached to the glycerin test is amply justified. It has been stated that pure creasote was soluble in anhydrous glycerin. This is certainly not my experience; but if it be true that some varieties of creasote dissolve in absolute glycerin, they will doubtless be precipitated by the least dilution, and can thus be distinguished from mixtures containing considerable proportions of the coal-tar acids.

Mr. J. Williams examined a sample of German creasote which was supposed to be pure, and which dissolved in glycerin; but the fact that 40 per cent. of the sample distilled at 200 to 203, together with other characters, renders it very probable that it contained an unacknowledged mixture of the coal-tar acids. It must not be forgotten that cresylic acid is much cheaper than carbolic, and is far more difficult to distinguish from creasote, even when unmixed with it.

I have thought it best to place my results on record in the fullest possible detail, as it is just the omission to do this that has caused so many confusing and incorrect statements to appear in our text-books. The tests described are remarkably liable to failure when the conditions are slightly varied. This is notably the case with the reactions with solutions of soda, a change of temperature or strength of the solvent causing extraordinary variations in the results.

Mr. Williams said Mr. Allen did not seem to have read or remembered his paper quite accurately, and he must remind him that he made some pure guaiacol (or creasote) from guaiacum itself, so as to be quite certain that it was free from carbolic acid. He found it was perfectly insoluble in Price's glycerin, but when he mixed 30 per cent. of carbolic acid with it, that mixture was perfectly soluble. He also found Morson's creasote insoluble in glycerin, and therefore concluded that it had all the characteristics of true creasote. Still, when this was mixed with 30 per cent. of ordinary crystallized carbolic acid, the mixture was perfectly soluble. What he attempted to do in his former paper was to find a test, if possible, to distinguish carbolic acid when mixed with creasote, but although he could easily find a test which would distinguish carbolic acid from creasote when separate, the conclusion he came to was that he was

quite unable to determine the admixture of the two. The assumption he arrived at was, that as the German creasote dissolved in glycerin, it must be like the gnaiacol or Morson's creasote when mixed with carbolic acid.

Mr. ALLEN said he did not understand that that was the result of Mr. Williams's paper. He understood him to believe that the sample he examined was pure. It appeared from what Mr. Williams now said that they were quite agreed as to the mixed character of that creasote.

Mr. GROVES asked if Mr. Allen was quite sure that Morson's preparation was always identical and uniform.

Mr. ALLEN said he was not sure at all; he did not know anything about it. He had experimented on a sample of Morson's creasote, and described it as nearly as he could. Messrs. Morson would no doubt be able to say whether their preparation was always the same.

A vote of thanks was given to Mr. Allen.

A REACTION OF ORANGE-FLOWER WATER.

By R. REYNOLDS, F.C.S., AND C. H. BOTHAMLEY.

A few months since the following prescription was presented and was duly dispensed:—

℞	Bismuth. Alb.	ʒiss.
	Acid. Nitro-mur. Dil.	ʒiss.
	Tinct. Gentian. Co.	ʒss.
	Sp. Chloroformi.	ʒiss.
	Aqua Aurantii	ad ʒviij.

Misce.

The patient complained that the mixture, including the deposit, had a pinkish hue, which was not the case to such a degree when the same medicine had been dispensed elsewhere.

Some experiments showed that the coloration was due to a reaction between the orange-flower water and nitro-hydrochloric acid Although we believe that few pharmacists have had this reaction brought under their notice, the fact is already recorded in Hanbury and Flückiger's "Pharmacographia," where it is said of orange-flower water, "Acidulated with nitric acid, it acquires a pinkish hue more or less intense, which disappears on saturation by an alkali."

The literature of the question is contained in its most complete

form in Gmelin's "Handbook of Chemistry," vol. xiv., page 386. Here we find the following statements under the head of oil of neroli, viz.; When orange flowers are distilled with water, "the oil which passes over is a mixture of two oils, one easily soluble in water and fragrant; the other sparingly soluble, of less agreeable odour; the latter floats upon the watery distillate and is easily separated (Soubeiran). Orange-flower water treated with nitric acid acquires in a few minutes a rose-red colour (Ader and others). With oil of vitriol it becomes rose coloured (Le Roy), but Ader insists that this is only the case when the oil of vitriol contains nitric acid, and he adds that it is not coloured by hydrochloric acid. Ether, almond oil, and castor oil abstract from orange-flower water the whole of the volatile oil; the ether solution, mixed with nitric acid, immediately assumes a rose colour, and leaves on evaporation a fragrant volatile oil (Ader, 1830, *Journal de Pharmacie;* also Soubeiran)."

Our experiments may be divided into two sections; firstly, the isolation of the soluble oil; secondly, its reactions.

1. In order to separate the soluble oil, 300 c.c. of orange-flower water were introduced into a glass tube about one metre in length and twenty mm. diameter, having its lower extremity drawn out and closed by a pinch-cock and india-rubber tube, as in Mohr's burette, whilst the upper end was drawn out and fitted to receive a small cork; sixty c.c. of absolute ether were added and thorough agitation effected. After separation the operation was repeated with 30 c.c. of fresh ether. The mixed portions of ether were placed in a small distilling flask, and the ether was evaporated in a current of air. Some of the volatile oil may have passed off with the ether, and a slight odour favoured this supposition, but as the flask was constantly coated with ice owing to the refrigeration caused by the rapid volatilization of the ether, the process of evaporation could hardly have been effected more favourably as regards the avoidance of loss. The oil obtained weighed 2·126 grams = 0·71 per cent. upon the orange-flower water used. It had solidified towards the close of the process, but rapidly liquefied when evaporation ceased. It possessed a deliciously fragrant odour.

2. The reactions of the oil with nitric acid (normal strength, 63 grams per litre) are those stated for orange-flower water by previous observers, but intensified in degree. The colour may be described as crimson red; that with orange-flower water is faint red. We have to differ from Ader on two points: viz., we find that pure sulphuric acid produces the rose colour with orange-flower

water, and that hydrochloric acid does the same; both reactions being much less marked than with nitric acid.

The orange-flower water after exhaustion by ether gave no trace of coloration with nitric acid. It was not, however, absolutely deprived of odour, but had lost its characteristic scent, and now possessed an odour suggestive of rose water.

We may add that if strong nitric acid be added drop by drop to orange-flower water, the rose colour at first produced is destroyed when the quantities of the two liquids are about equal.

If the orange-flower water be agitated with nitrous fumes and dilute nitric acid then added, no colour is produced; or if acid largely charged with such fumes be added to orange-flower water, the colour appears for an instant, but is almost instantly destroyed.

Before leaving the subject of orange-flower water, it may not be inappropriate to its bearings on pharmacy to quote from Parrish's "Pharmacy" (ed. 1859) the following statement: "Its sedative effects, which are not generally known in this country, and not noticed in our works on materia medica, adapt it especially to use in nervous affections. In doses of a tablespoonful it is found to allay nervous irritability and produce refreshing sleep." If orange-flower water has valuable hypnotic qualities, it should be welcomed as a desirable rival to various less innocent substances now used for the purpose.

Mr. GREENISH said he had worked a little on this subject, and had noticed that if orange-flower water were brought up from the laboratory into the shop, in the course of a little time it seemed to deposit yellow particles, and finally entirely lost its odour of orange. He had examined this deposit microscopically, and under a tolerably high power he found these yellow spots were quite circular, and had all the characters of a ferment. More than that, mixed up with these particles, which appeared to be cellular and organized, he found bacteria. Thinking it possible that the orange-flower water in the laboratory might be in a different condition, he poured off a little into a measure, and found it perfectly free from the deposit, but at the bottom of the same stock vessel there was a large quantity of yellow deposit. He had noticed the action of nitric acid on orange-flower water in turning it pink, and that it turned that with a deposit pink also. He had distilled a portion, and that also with nitric acid became pink. His idea was that the oil had become oxidized, and gradually lost its odour by being exposed to

the light and air. About four years ago a paper appeared in the *Archiv der Pharmacie*, on this subject, by Dr. Hoffmann, who had endeavoured to ascertain the cause of the coloured particles, and came to the conclusion that they were due to portions of coniferous wood, as he found such portions in orange-flower water. He (Mr. Greenish), however, had never been able to find any coniferous wood whatever, nothing but these little circular apparently organized particles. Dr. Hoffmann, then examined the colour spectroscopically, and found the absorption bands were precisely the same as those of the phytolacca which was used in the south of France for colouring wines, and thought that possibly a little of this colouring matter might have got into the orange-flower water. About eight years ago Gobley, in the *Journal de Pharmacie*, wrote a paper on this subject, and stated that there were two waters made in the south of France, one from the leaves, and the other from the flowers, and that the water from the leaves did not, on the addition of acid, turn pink, while that from the flowers did. He than gave a formula—two parts of nitric acid, one of sulphuric acid, and three of water—as a test solution for determining whether the water came from the flowers or the leaves; but unfortunately it turned out that if the water was 90 per cent. from the leaves, and only 10 per cent. from the flowers, it yet gave this pink colour. He finished by stating that he found that after a time the orange-flower water lost the property of becoming pink on the addition of nitric acid. He (Mr. Greenish) therefore concluded that this was due to the loss of the oil; and to determine what really gave the colour to this water he dissolved a drop of oil of neroli in spirit, and poured it into water, and on adding a drop of nitric acid, he found the same pink colour as was observed in orange-flower water.

Mr. Groves said he should like to elicit what was the general practice in dispensing orange-flower water. They knew it was an officinal substance, but the mode of preparation was not stated. He observed in the opening of the paper that there were complaints of the pink colour as being greater in the case of the medicine then dispensed, than in previous cases; and the question occurred to him whether they ought not to regard the water so imported as a triple water, and dilute it. When used for syrup of orange flower, it must be used as imported, or the syrup would not be sufficiently flavoured; but he doubted whether it would be agreeable to the patient, or would be expected by the prescriber, that in dispensing ordinary medicines, where the excipient was simply orange-flower water, that the water of the full strength should be used. His

practice was to dilute the orange-flower water as imported with two parts of water, from a desire to make it agreeable.

Mr. Ekin said the usual practice certainly was to dilute in the proportion Mr. Groves named. He did not think physicians would mean the concentrated water to be given. He understood Mr. Greenish to say that it deteriorated when brought from the laboratory into the shop. He had always understood that it improved immensely by keeping; the French houses who supplied it recommended that it should be kept for some time, in order that the flavour might mature.

Professor Markoe said the orange-flower water was always used in the States in a dilute form. There was no doubt that if orange-flower water were kept in an open vessel, or exposed to the light, it very rapidly spoiled, and this was forced on their attention by the more intense sunshine in the States. If the package were opened, and kept in a dark place, stopped with a plug of cotton, it improved.

Mr. Greenish said he had several times put orange-flower water on the shop shelf and allowed it to remain there for some time, and the aroma entirely disappeared. He did not think there was a single preparation which did not change by being exposed in the shop to the influence of light.

Professor Markoe said he had tried the experiment, and found the orange-flower water completely spoiled by a fortnight's exposure on the shop shelf.

Mr. Payne thought Mr. Grove's inquiry was a very necessary one. The medical men in his part of the country very rarely ordered orange-flower water in any great quantities, but generally from half ounce to two ounces in an eight ounce mixture; and his custom was to use it as imported.

Mr. Coster said his practice always was to dilute the triple orange flower water as imported, with two parts of water.

Mr. Conyngham thought when a mixture was ordered to be made up with orange-flower water it was invariably used diluted.

Dr. MacSwiney said he had always understood that orange-flower water, which was a very favourite medium for the exhibition of other remedies, was a rather concentrated article, and accordingly it was his practice to order two ounces with an eight ounce mixture, believing that quantity would fully flavour it. He might be wrong, but he was not aware of the fact that there was any difference in the strength of the water; at any rate there was but one preparation included in the British Pharmacopœia, and he confessed he was astonished to hear of *two*, of different strength, being kept in

stock for dispensing. Was it right that it should be so? He thought this was another instance of a most objectionable practice which prevailed, of departing from some one uniform standard of strength and composition of substances liable to be prescribed by the physician. He took leave to say that pharmaceutical chemists, instead of favouring each one a different composition and mode of preparation of articles in general use amongst medical men, as remedies, should all supply the substance of exactly the same stable composition, and with a name which, as far as possible, would convey an intimation of its true nature.

Mr. BENGER asked if there were any stronger reason why orange-flower water should be used of a greater strength than rose water. He believed it was the general custom in dispensing to dilute it with two parts of water, and so reduce what was described as *triple* to normal strength.

Mr. FRAZER said that in Scotland it was the universal practice to dilute it. When he first became a druggist there was no triple water, and since it came into use they had diluted it two to one, for dispensing purposes. They kept a stock in a cellar in stone jars, and always found it richer as it got old.

The PRESIDENT said it seemed to him that the usage in this respect must a great deal depend on what they understood to be the purpose of the prescriber. They had heard from one gentleman practising in that city, who was probably a fair representative of the profession, that orange-flower water was mainly used for flavouring purposes, and in that case it was perfectly clear, that so long as a respectable amount of flavour was produced it did not much matter whether the concentrated or the dilute preparation were used. It happened, however, in his neighbourhood that prescribing physicians were aware of the fact that this water had considerable sleep-producing power, and he had frequently known it given alone for this purpose, and answer extremely well. That, perhaps, was not a subject for him to discuss, but, as the opinion appeared to prevail to some extent, it had been his invariable practice for many years to employ the strong orange-flower water, thinking he had no right to an opinion as to whether this or that prescribing physician meant it to be used simply as a flavour or on account of its medicinal value. There was this difference between orange-flower water and rose water, that there was an officinal preparation for aq. rosæ, but no official strength given for orange-flower water. If there were any great medicinal value in the preparation, it was unfortunate that it should be open to such varia-

tions, that in one case it might be three times the potency of another.

Professor MARKOE asked what was understood in England by the terms, single, double, triple, or quadruple. Was the latter four times the strength of the single? it certainly was not four times the price. In the United States they obtained their supplies from France, except a little which now came from Florida.

Mr. SUMNER thought the origin of triple water was twofold. The main object was in order to meet the duty on perfumed waters from France, so as to get three times the strength for the same amount of duty: it was found also that the stronger water kept better.

Mr. LONG said this was one of those unfortunate questions which much troubled pharmacists, because there was no legitimate strength. It was no use being over anxious about what other people did, nor must they always think it was their duty to give a higher strength, or that the stronger a thing was the better. He hoped in the next edition of the Pharmacopœia an official strength would be laid down.

A vote of thanks was passed to Messrs. Reynolds and Bothamley.

The next paper read was entitled—

NOTES ON VARIOUS SAMPLES OF DIALYSED IRON.

BY R. REYNOLDS, F.C.S., AND C. H. BOTHAMLEY.

Amongst those members of the British Pharmaceutical Conference who can carry back their recollections to the meeting at Nottingham in 1866, there are doubtless some who have not forgotten the specimen described in the following extract from the annual report for that year:—"Exhibition of Objects relating to Pharmacy. Dr. Wagner, Pesth, Hungary. Ferrum dialysatum (oxydatum solutum in aqua). A reddish brown fluid of pure astringent taste. Dose in case of diarrhœa or dysentery, one scruple to a dram." After this introduction, rather to British pharmacists than to British pharmacy, dialysed iron relapsed into a Rip Van Winkle sleep, and appropriately enough turned up in about ten years time in the United States. The *Pharmaceutical Journal* has no further notice of the new remedy until the volume for 1877–78.

where we find eight articles on dialysed iron, the whole being quoted from American writers.

During this period, however, the new remedy was certainly becoming better known in France and Germany, and was more slowly, perhaps, taking its place in the Pharmacy of Great Britain. Squire's "Companion to the British Pharmacopœia," eleventh edition, 1877, contains the following notice :—

"Liquor Ferri Dialysatus.—This preparation is an improvement upon the liquor ferri chloroxydi, as it is dialysed almost free from acid, and has no unpleasant taste. Each fluid dram contains two grains of oxide of iron."

The Paris Pharmaceutical Society has included dialysed iron in its formulæ for new medicaments (*Pharm. Journ.*, July 14, 1877), and has given its quasi-official sanction to a standard of strength and purity, whilst the new remedy is waiting for the more important authority of acceptance by the framers of any legal pharmacopœia. It is not necessary to quote details of the process given. The result is said to be "a ten per cent. solution." The solution of ammonia is directed to be used of "sp. gr. 1·169." Have not misprints crept into both these directions, or is the residue left on evaporation to be weighed and calculated in an undefined condition of dryness ? * The properties of the product are thus described :— "The highly coloured solution is no longer precipitated by silver nitrate, and gives no acid reaction. It is then absolutely free from the disagreeable taste of certain ferruginous preparations."

Professor J. M. Maisch has published an interesting "Note on Dialysed Iron" in the *American Journal of Pharmacy* for July, 1877 (reprinted in *Pharm. Journ.*, August 4, 1877). Professor Maisch refers to the strength adopted by the Pharmaceutical Society of Paris as being 5 per cent., which is a close approach to the maximum amount found to be possible by Graham in his researches on the diffusion of liquids (1861). Professor Maisch says, "As to the advantage of the dialysed over the oxychloride made by saturation with hydrate of iron, that is best ascertained by comparing their taste, which in the former is scarcely astringent, whilst that of the latter is distinctly ferruginous. A preparation now before me, imported from Germany, called ferrum oxydatum dialysatum, I do not hesitate to say has been made by saturation alone, or by incom-

* "The figures are misprints, which unfortunately escaped notice at the time. They should have been 'sp. gr. 0·924,' and '1 per cent.' An erratum for the former was printed in the *Journal* of the following week, p. 60.—Ed. Ph. J."

plete dialysis, for its reaction is distinctly acid, and its taste quite styptic."

The determinations given below were made by the following method :—The solution was weighed into a beaker, heated, the iron precipitated with a slight excess of ammonia, the liquid again heated nearly to boiling, and filtered. The precipitate was well washed with hot water, dried, and ignited. The filtrate was acidified with pure nitric acid, and the chlorine precipitated as silver chloride.

The specific gravities were taken with great care in a long necked sp. gr. bottle, the water value of which had been accurately determined. They were taken at 18° C., and compared with water at the same temperature. The results are given in the following table :—

Source.	Reaction.	Sp. gr.	Fe_2O_3 per cent.	Cl per cent.
1. London, M. . . .	Neutral.	1·0439	4·707	0·206
2. German.	Acid.	1·0572	5·866	0·219
3. Fer. Bravais. . . .	Neutral.	1·0316	3·430	0·194
4. London, H. . . .	,,	1·0560	4·484	0·051

The above table tells nearly all that we have to say. We may add that as to the quality of taste, all the samples but one might be described as almost tasteless. No. 2 was the exception, it having a much more marked chalybeate flavour. It will be noticed that this was the only sample showing a distinctly acid reaction to test paper. When it is compared in other respects with Nos. 1, 3, and 4 we find it with the highest specific gravity, and also higher in the percentage of both ferric oxide and chlorine. In fact, the amount of ferric oxide exceeds that which is possible in dialysed iron. It may be remarked that this was offered at a much lower price then the other samples, and it is probably one of the class of imported preparations condemned by Professor Maisch.

From its readiness the reaction with test paper should always be determined. Blue litmus paper may be wetted with the specimen under trial, and washed by the finger under a stream of water, then dried. No. 2 was the only sample yielding a distinctly red colour, the others retaining a more or less purple tint.

The determinations recorded in this paper were made by Mr. C. H. Bothamley in the laboratory of the Yorkshire College, Leeds.

Professor ATTFIELD said he had been lately looking into the grand volume relating to Graham's researches, printed at the expense of Mr. Young, with regard to the question of the dialysis of oxychloride of iron, and he found that Graham did not succeed in obtaining a non-chlorinous dialysed iron. His solution of oxychloride of iron contained about $1\frac{1}{2}$ parts of the chlorine to about $98\frac{1}{2}$ of iron, whereas the authors stated that they obtained specimens containing 4·84 of iron, and 0·055 of chlorine, which would be only about one part of chlorine to 99 of iron. He should not have drawn attention to that but for noticing that Mr. Bothamley had obtained his oxide of iron by adding ammonia to the iron solution, and in that case he should have thought the hydrate of iron, in going down, would take a little chlorine with it. It was desirable to know that this dialysed iron was not merely a solution of iron, but that there was always chlorine there, which doubtless had some function in keeping the iron in solution.

Dr. SYMES said he had dispensed dialysed iron for the last ten years at least, and he had found that the more of the chloroxide it contained the longer and better it would keep. If the process was carried too far it would become pectised on the dialyser; the secret of preparing dialysed iron was simply in stopping the process at that particular point at which as large an amount as possible of the crystallizable chloride of iron was got rid of, without carrying it too far and producing a product which would either pectise on the dialyser or become of that gelatinous condition very soon afterwards. One of Graham's difficulties was to prepare a solution which should be as nearly as possible that of the oxide, which would keep for any length of time, and any one reading his paper would feel that it was almost hopeless to prepare a solution which could be kept pharmaceutically. A syrup had been recently introduced and prescribed which he regarded as unsatisfactory, for almost anything mixed with dialysed iron was liable to decompose it after a time, apparently by bringing about that particular change which Professor Graham referred to. The question had often been put to him with what substances it was compatible, and his advice generally was to mix it with a little water and nothing more. A little syrup might be added, but if kept for any length of time afterwards it was liable to gelatinize.

Professor MARKOE said a practical rule would be to stop the process of dialysis the moment there was not a distinct reaction with nitrate of silver. The average composition, if his memory served him, would be the molecule of ferric chloride to nineteen of ferric-hydrate.

Mr. UMNEY remarked that they had frequently had occasion to regret calling preparations by wrong names, and this was a glaring instance. Instead of dialysed iron, it should be called colloid iron, because the iron solution did not pass through the dialyser, but remained behind.

Professor ATTFIELD said that Professor Graham called the fluid that went through the dialyser the diffusate.

Mr. GREENISH said he made syrup of dialysed iron some time ago, and had dispensed it several times. It had not apparently undergone any change, but seemed to keep very well. The strength was about 3 per cent.

The PRESIDENT said that in the absence of any well recognised strength, that which he had adopted had been that which exactly corresponded with the liq. ferri perchloridi of the Pharmacopœia. He found a simple method of manipulation was to convert an ordinary Wedgewood funnel into a dialyser, spread a nice piece of parchment over the bottom, gather it up the side, tie it round the neck, and introduce the mixture of liq. ferri perchloridi fortior, water, and ammonia, through the little aperture in the funnel. It was manipulated simply by changing the water twice a day for a fortnight, by which time the object was perfectly attained. It was a sort of rule of thumb process, but all the crystalloids were thus well dialysed from it, and the result was not in a condition for pectising.

Mr. WILLIAMS remarked that a far simpler plan was to take an old sieve, tie it round with parchment paper, and put it in the water-bath.

Dr. SYMES said it would be better if a current of water were allowed to run underneath it.

Mr. GREENISH said some syrup was green, and some very dark. It would be well if they could come to some understanding what the strength should be.

Mr. WILLIAMS thought 5 per cent was about the strength usually considered the best. That was understood to be Bravais' strength.

A vote of thanks was accorded to the authors of the paper.

The next paper read was a—

PRELIMINARY EXAMINATION OF PITURI OR PITCHERE.

By A. W. Gerrard, F.C.S.,

Teacher of Pharmacy, University College.

I recently received from Professor Ringer a small drug specimen labelled "Pituri" or "Pitchere," and presented to him by a student of our college from Australia, with the observation that it was a most powerful substance in regard to its physiological action, and required to be used with great caution. The specimen weighed thirty grains, and was composed of small broken leaves and herbaceous twigs. The leaves were of a pale green colour, and coarse surface, averaging one-eighth of an inch in width; being all broken transversely, their length could not be determined; the back of the leaf only showed an indistinct midrib; veins were not discernible.

A portion of the leaf when moistened with water and examined by a lens, displayed upon its upper surface a coarse prominent honeycomb-like venation, forming an irregular fringe each side of the midrib; in the depressed portions of the leaf were displayed small rounded glands, transparent and of a brown colour. The form of the leaf, as far as I could judge by the broken portions, appeared to be subulate, narrowing at the base.

At a recent evening meeting of the Pharmaceutical Society, in the course of a discussion, pituri was incidentally mentioned by Dr. Bancroft as a drug most extraordinary and remarkable in its effects, supplies of which he was expecting. Further references being sought they were found in the *Year-Book of Pharmacy*, 1874, p. 52, and were written by Dr. G. Bennett to the *New South Wales Medical Gazette*. He describes the pituri in the form of dried leaf, the botanical character of which could not be ascertained through its broken state. In the same connection is an abstract of a paper by Dr. Bancroft, read before the Queensland Philosophical Society, March, 1872, on the pituri. They are very interesting. I will give a few extracts.

"The plant is used by the natives as a stimulating narcotic; and its use is confined to the men of a tribe called Mallutha, all the males of which tribe are circumcised."

"The old men before any serious undertaking chew the leaves, and are then in a sufficiently courageous state of mind to fight or undertake any serious business."

"One old man refused to have anything to say or do until he had

chewed the pituri, after which he rose and harangued in grand style, ordering the explorers to leave the place."

In small doses pituri has a highly intoxicating effect; also causes vomiting and a free secretion of saliva; in larger doses paralysis and death.

A later reference to pituri has been made by Baron Mueller, *Year-Book of Pharmacy*, 1877, p. 222. The drug is to be found growing in the desert scrubs, from the Darling River and Barcooto to West Australia. In his opinion it is derived from *Duboisia Hopwoodii*. The blacks use it to excite their courage in warfare; a large dose infuriates them.

On first receiving this drug I concluded, from the very small amount of it at my disposal, it was not worth attempting to isolate its active constituent; but a second consideration, based upon its active attributes, led me to make the following experiments:—

The pituri was finely powdered and exhausted with 85 per cent. alcohol, containing a little tartaric acid; upon dispersion of the spirit the extract was dissolved with water and filtered, and the solution thus obtained treated with the following reagents (as it was necessary to be very economical, drops only of my solution could by examined). With tannic acid it gave an abundant white precipitate. With iodohydrargyrate of potash an abundant white precipitate. With molybdate of soda and nitric acid a yellow precipitate, soluble in sodic hydrate. With perchloride of platinum a brownish yellow precipitate. With the hydrates and carbonates of potash, soda, and ammonia I obtained no precipitates, but the mixed drops of these latter were treated with chloroform, and the chloroform upon evaporation left a residue powerfully alkaline; this was diluted with a little water and nitric acid, and gave confirmatory reactions.

After these conclusive results the bulk of my solution was treated with ammonia and chloroform, when I obtained a nearly colourless moist film of a powerful alkaloidal substance. This alkaloid, or "pituria" as it may be called, is freely soluble in water, alcohol, ether, and chloroform. The film of alkaloid left after evaporation of the ether showed at its outer edge a fine fluorescence. A small portion tasted did not yield much bitterness but rather the numbing sensation of aconitia, but much less persistent than aconitia; with acids it forms neutral compounds. The nitrate and chloride of pituria which I prepared, drops of which were placed on watch glasses, did not crystallize on evaporation, but left a varnish. I think it very probable with more material at disposal crystalline salts may be easily prepared.

The remaining portion of the pituria I have placed in Professor Ringer's hands, who will investigate its physiological action so far as the amount at disposal will admit.*

In conclusion, with only one grain of the leaf of pituri it is possible to demonstrate most plainly the presence of the alkaloid: simply moisten the leaf with water, add a drop of ammonia, and shake with one dram of ether; the ether will leave upon evaporation sufficient alkaloid to show several of its reactions.

Mr. DRAPER asked if Mr. Gerrard found the solid alkaloid itself fluorescent, as this was a rare phenomenon amongst solid bodies.

Mr. GERRARD said the edge of the solid film left after the evaporation of the ether was fluorescent. There were other alkaloids which presented the same appearance.

A vote of thanks was passed to Mr. Gerrard.

The next paper read was a

NOTE ON PHOSPHORUS IN THE PILL FORM.

By A. W. GERRARD, F.C.S.,

Teacher of Pharmacy at University College.

During the past four years much has been said and written about the dispensing of phosphorus, and various methods have been suggested for presenting this active and useful drug in a form which shall be at once reliable, uniform, and elegant. Of the various novel suggestions made, none seems to have received anything like a general adoption; and glycerin, resinous and albuminous solutions of this drug, are rarely or never seen in the physician's prescription.

Of the two methods by which phosphorus can be exhibited, solid and liquid, the pilular or solid is that to which preference is mostly given, and this preference may be explained upon good reasons; for instance, the material in which the phosphorus is diffused in a pill is small in bulk as compared with an emulsion or mixture, therefore the phosphorus in the pill is more likely to be preserved from change

* As Dr. Ringer and myself are anxious to obtain further supplies of pituri, none being obtainable in this country, any gentleman or pharmacist in Australia or New Zealand forwarding small parcels of an ounce or so, shall receive our best thanks. [The British Pharmaceutical Conference has offered a grant for the purchase of pituri.—*Ed. Trans., B.P.C.*]

or loss by oxidation and to yield a more uniform therapeutic effect. Again, as a rule pills do not produce the nauseating effects of a dose of phosphorus in the fluid form; pills are also more convenient and portable.

Of the various methods recommended and mostly used for rendering phosphorus into pills, I shall mention two, and the objections attached to them. The first method is to dissolve phosphorus in carbon bisulphide, to pour this upon compound tragacanth powder, and make into a mass with water. The other method is to dissolve phosphorus is melted cacao butter, and when cold rub smooth in a mortar, and divide into pills; of these two processes I give the preference to the former, as the latter is most impracticable, for from the greasy nature and low melting point of cacao butter it cannot be handled without clothing the fingers with a covering of phosphorescent fat, very annoying to the operator; and the mass does not yield well and regularly under the pressure of the pill cutter, but breaks into irregular fragments, which necessitates a remixing. My principal objection, however, to both processes is that much loss of phosphorus takes place by oxidation during the process of manipulation, and unless the manipulation be dexterously and expeditiously carried out this loss is considerable; the prevention or reduction of this loss to a minimum is the main object of this note, and the following in the process I have employed for a period extending over a year with very good results.

I will give a formula for thirty pills, each pill to contain one thirtieth of a grain of phosphorus.

℞	Phosphorus	1 grain.
	Carbon Bisulphide	20 minims.
	Compound Tragacanth Powder . .	90 grains.
	Chloroform	a sufficiency.
	Water	a sufficiency.

Place the phosphorus in a Wedgewood mortar, pour over it the carbon bisulphide, then add the tragacanth powder and ten minims of chloroform, mix into an uniform product, then add water a sufficiency to form a pill mass, maintaining during the whole of the process the presence of chloroform; divide into thirty pills.

The novelty in this method depends upon the presence of chloroform; and the explanation of the part it serves is as follows:— Whilst chloroform is present in the mortar it forms a heavy vapour which surrounds the phosphorus, preventing the contact of air and the consequent oxidation; of course as soon as the materials are kneaded into the necessary uniform mass the whole of the chloro-

form is allowed to evaporate; when the chloroform has evaporated, some surface—and only surface—oxidation takes place.

In conclusion, I would advise those who wish to try the experiment of dispensing phosphorus, to compare the method I have given both with and without chloroform; in the one case you have much phosphorescence and irritating fumes evolved; in the other there is no apparent phosphorescence, and very little fume. In fact I have worked eight ounces of mass into pills easily by this new process, which otherwise would almost have been an impossibility; the greatest advantage, however, I consider it offers, is that the patient gets the nearest possible approximation to the dose given in the prescription.

Mr. Greenish said he had paid some little attention to the dispensing of phosphorus pills, and the plan he adopted was somewhat different to that described. He dissolved the phosphorus in bisulphide of carbon, then mixed the cacao butter with it, and after that anything else required. By putting the cacao butter into the mortar with the solution he considered the difficulty mentioned by Mr. Gerrard was got over.

A vote of thanks was passed to Mr. Gerrard.

The next paper was—

NOTES ON A NEW DOUBLE IODIDE.

By Frederick W. Fletcher, F.C.S.

The strong tendency exhibited by many of the iodides to form double salts is well known. Within the last ten days a new and striking instance of this characteristic feature has come under my notice, and the compound produced is in many respects so remarkable, that I venture to submit the few notes which I have been able to make respecting it, to the consideration of the Conference.

In experimenting upon a complex solution, which amongst other things was known to contain a salt of quinine, I was somewhat astonished to find a copious scarlet precipitate produced on the addition of potassium iodide. The colour was not sufficiently vivid for that of mercuric iodide, and with the exception of the little known but curious double iodide of mercury and copper, no iodide with a like appearance, produced under similar conditions, suggested itself.

Having collected and washed the precipitate, I proceeded to examine it qualitatively, when it was found to contain besides the halogen, bismuth and quinine. Solutions of these last two substances were then prepared and mixed, and I found that not only in each case was this brilliant precipitate obtained on the instant that an iodide was introduced, but that by experimentally regulating the proportions of the three salts, it was possible to remove the whole of the quinine, the bismuth, and the iodine from the solution in the form of this beautiful double salt.

A few ounces of the compound having been carefully prepared, I submitted a portion to analysis in order to ascertain the relative proportions in which the elements present were combined, and thus arrive at its proper formula.

The bismuth was thrown down from a solution of the salt in ammonium citrate containing excess of acid, by hydrogen sulphide, 1 gram yielding ·322 gram $Bi_2 S_3$, equivalent to 26·2 per cent. of metal.

The quinine was estimated in a similarly prepared solution by Allen's ether method, a process which always gives unexceptionable results.

1 gram of the salt yielded ·202 gram anhydrous quinia, or 20·2 per cent.

The iodine was separated as a silver salt, 1 gram yielding ·989 gram Ag I, equal to 53·4 per cent. of iodine.

From these results it is evident that the salt is a compound of tri-iodide of bismuth and hydriodate of quinine, in the proportion of two molecules of the former to one of the latter substance, and it would therefore have the formula—

$$(Bi\,I_3)_2\,C_{20}\,H_{24}\,N_2\,O_2.\,H\,I.$$

The theoretical and actual results bear the following relations :—

	Calculated.	Found.
Bismuth	25·7	26·2
Quinine	19·9	20·2
Iodine	54·4	53·4

The salt is very sparingly soluble in cold, but more freely in hot water.

Rectified spirit dissolves it slightly in the cold, but very readily when warmed.

It is completely taken up by an alcoholic solution of potassium iodide, forming a brilliant crimson solution.

It is decomposed by the stronger acids with liberation of iodine.

Digested in strong solution of ammonia, its colour is destroyed, and an insoluble residue of oxide of bismuth and quinine remains.

Gradually heated in a porcelain crucible, it at first fuses to a shining purplish black mass, and as the temperature increases, fumes of iodine, together with scarlet coloured vapours, are evolved, which condense upon a cold surface in a parti-coloured deposit, which presents under the microscope a crystalline structure.

When a few grains of the salt are rubbed upon paper and gently warmed, like the double iodide of mercury and copper, it becomes black, regaining its original colour gradually if allowed to cool spontaneously, and instantly if the paper be laid upon something cold, such as a steel knife or bottle of water.

Whether this compound possesses any special medicinal value is a point which, of course, experiment can alone determine. All that can at present be said is, that if it is desired to administer quinine and bismuth in conjunction with iodine, the salt under notice affords an admirable method of doing so.

From a chemical point of view the salt is interesting, and the decomposition which gives rise to its formation might possibly be found of value as the basis of a volumetric process for the estimation of salts of bismuth and quinine.

Mr. ALLEN said this substance was particularly interesting, as giving another instance of the curious property of iodides of changing colour on exposure to very slight heat. Another case was the iodide mentioned by Mr. Fletcher as produced by mixing a solution of a cuprous salt with solution of a mercuric salt; if this mixture were added to an iodide, such as iodide of potassium, it gave a double iodide of a similar colour to the one now shown, but at the least increase of temperature it turned perfectly black. If a piece of paper covered with this compound were warmed, the compound turned black, and if a finger were drawn across the back of the paper it made a red stain. Upon cooling it again became red, and the experiment could be repeated indefinitely; and it was the most delicate instance of change of colour due to a slight change of temperature that he knew of.

A vote of thanks was passed to Mr. Fletcher.

The Secretary read a paper entitled—

LABORATORY NOTES.

By Henry Barton.

Liq. Ammon. Citratis.

This preparation is unsatisfactory from its proneness to change, and when required in a hurry has to be freed from its unsightly appearance by filtration through paper or cotton wool; but prepared four times the strength of the Pharmacopœia solution, it keeps perfectly, and the addition of three parts water to one of the concentrated solution has always the freshness so satisfactory to the dispenser.

Tinct. Cort. Limonis.

Tinct. Aurant. Recentis.

The fresh peel sliced thin enough is a simple and original process, and when carefully performed presents considerable surface to the spirit; but undoubtedly the best method of proceeding is to grate the rind from the surfaces of the fruit; the grated, light, almost wool-like peel is in splendid condition for the action of the menstruum, and repays any extra patience required in its preparation.

Sapo Durus.

Sapo Animalis.

The weighed average result of drying into a suitable pulverizable condition numerous recent samples from different warehouses, has in my hands given an average loss of 25 per cent.; taking into consideration that parcels are received into stock and kept for longer or shorter periods, under the varying circumstances of storage in damp cellars, cold or hot warehouse rooms, etc., the liquid preparations of soap must vary considerably both in the amount of solid matter and the water they contain.

I would suggest that in all cases dried soap should be used, not in the form of powder, but in that of shavings produced by planing the bars and exposing the thin curls to a suitable temperature until a sufficient dryness has been attained. The amount used in the various formulæ could be readily adjusted.

Chloric Ether.

Upon the introduction of tinct. chloroformi co. and sp. chloroformi, it was said that the former would in strength represent chloric ether and probably supersede it; whilst the latter would be used as a weaker preparation, as also by those who did not desire the coloured tincture. Both are a great deal prescribed, but neither so much so

as the chloric ether, and it is to the want of uniformity in the latter I would draw attention,—the amount of chloroform varying as much as 50 per cent. in different specimens,—and would suggest that the strength of the compound tincture, one in ten, should be taken as the standard, which would sometimes obviate the remark, "This mixture does not taste the same as before."

Pil. Phosphori.

The Pharmacopœia formula is not a popular one in the profession; and amongst all the various preparations and modes of preparation, from resin to suet, none appears to me to produce a mass in all respects so satisfactory as that suggested by Messrs. Allen and Hanbury in the *Pharmaceutical Journal* of May 20, 1876; the phosphorus dissolved in the bisulphide in a small phial, and added as directed to the other ingredients, requires neither the aid of fire nor water, the process is rapidly conducted, and the result admirable. For stock I have usually made the mass into fifty grain balls, representing one grain of phosphorus, and covered them with a pill coating. When required with other ingredients a minimum of spirit is usually all that is requisite.

A vote of thanks was passed to Mr. Barton.

The last paper read was a—

NOTE ON REICHERT'S IMPROVED THERMO-REGULATOR.

By Charles Symes, Ph.D.

Thermo-regulators are amongst the very useful and much neglected aids to pharmacy. The instances do not perhaps occur daily, but certainly not unfrequently, where the maintenance of a uniform temperature is most desirable if not indispensable. Extracts when not manufactured on the premises are often received too soft for dispensing purposes, and have to be further dried by the pharmacist himself. This is an operation of some delicacy, if the desired result is to be accomplished without injury to the product. The use of a thermo-regulator simplifies the work and renders it such as to require little care or attention.

In drying small quantities of precipitates, pepsine, and indeed in operations where desiccation or digestion is to be conducted at an uniformly moderate or even high temperature, these instruments

save the operator a considerable amount of time and anxiety. They vary in form; that with which I have the most experience is the one introduced by Mr. Benger some years since, and it works admirably, except perhaps when from frequent and lengthened use the small tap ceases to be air-tight, and this of course can easily be remedied; in fact, the weak point in these instruments generally is the possibility of leakage.

This will occasionally occur in the Bunsen regulator if it is not in a vertical position, and in it the mercury after a time becomes slightly oxidized and sluggish in its movement.

Reichert's instrument is specially adapted for small operations, such as heating liquids in flasks; being thin it readily passes into a narrow neck or through a perforated cork. Its action depends on the direct expansion of a column of mercury, instead of air acting on mercury as in the other instruments, and thus the possibility of leakage is reduced to a minimum. In its original construction the tube connected with the gas supply was fused into the instrument, but this was found inconvenient, and it was then passed through a perforated cork, which however has now been replaced by a well ground tubulated stopper. The improvement is apparently slight, but it is nevertheless important; it allows the instrument to be used at a higher temperature, near to the boiling point of mercury if so desired; the constant flow of gas can be regulated for low temperatures as well as the more or less intermittent one; and the point of the tube being always brought into exactly the same position and held rigidly there, it is protected from injury by any undue vertical pressure or lateral motion.

The PRESIDENT said this seemed a very valuable practical piece of apparatus.

Mr. GROVES said the special advantage of it was that the gas furnished by the small hole sufficed to keep the gas burner always going, and from time to time the gas was added to by the action of the instrument to keep up the proper temperature.

Dr. QUINLAN asked if a difference in the pressure of the gas had any effect on the action of the instrument. In Dublin the gas company had to maintain a minimum pressure of 6-10ths, but it sometimes went up towards evening to 32-10ths. Could this instrument be used in connection with a "Peebles" automatic gas regulator, such as he used himself, so as to keep the gas always at a pressure of not exceeding one inch?

Dr. SYMES said one object of the regulator was to meet the difficulty arising from various pressures. Immediately more pressure was put on at the gas works the temperature would rise in the flask, and then the supply of gas would be partly cut off by the instrument.

A vote of thanks was passed to Dr. Symes.

CLOSING BUSINESS.

THE PLACE OF MEETING IN 1879.

At the conclusion of the reading of the papers,

Mr. WARD (Sheffield) said he had much pleasure in delivering a message with which he had been charged by his brother pharmacists of Sheffield, namely, to give a warm and hearty invitation to the Conference to meet in that town next year.

Professor ATTFIELD moved that the thanks of the Conference be given to the chemists of Sheffield, and that their invitation be accepted. The pharmacists of that town had been warm supporters of the Conference from its birth, and he knew that there were many of them who highly appreciated the work of the Conference; he was sure that the Conference would find many friends at Sheffield.

Mr. J. WILLIAMS, President of the Pharmaceutical Society of Great Britain, seconded the resolution, which was carried unanimously.

Professor MARKOE begged to add that the American Pharmaceutical Association would probably hold it annual meeting in New York in the beginning of September, 1879, when any members of the British Pharmaceutical Conference who were travelling that way would be heartily welcome.

Mr. WARD said they should be very pleased to see as many of their Irish friends as possible in Sheffield next year.

ELECTION OF OFFICERS.

The following were elected as the Officers of the Conference for the ensuing year, and a resolution was also passed empowering the Executive Committe to fill up the vacancies, viz., one Vice-President, one Member of the Executive Committee, a Local Secretary, and an Auditor, from Sheffield:—

President.

G. F. SCHACHT, F.C.S., Clifton.

Vice-Presidents.

R. REYNOLDS, F.C.S., Leeds.
Professor TICHBORNE, F.C.S., Dublin.
*W. WARD, F.C.S., Sheffield.
J. WILLIAMS, F.C.S., London.

Treasurer.

C. EKIN, F.C.S., Bath.

General Secretaries.

Professor ATTFIELD, F.C.S., London.
F. BADEN BENGER, F.C.S., Manchester.

Local Secretary.

*H. W. MALEHAM, Sheffield.

Other Members of Executive Committee.

M. CARTEIGHE, F.C.S., London.
H. N. DRAPER, F.C.S., Dublin.
*G. ELLINOR, Sheffield.
T. GREENISH, F.C.S., London.
A. H. MASON, F.C.S., Liverpool.
C. SYMES, Ph.D., Liverpool.
J. C. THRESH, F.C.S., Buxton.
W. A. TILDEN, D.Sc., F.C.S., Clifton.
G. UMNEY, F.C.S., London.

Auditors.

W. HAYES, Dublin.
*G. A. CUBLEY, Sheffield.

* The names to which an asterisk is affixed are those of officers who have been appointed by the Executive Committee, in accordance with the resolution mentioned on page 604. —ED. TRANS. BRIT. PHARM. CONF.

A resolution was also passed empowering the Executive Committee to alter the place of meeting if it should happen, which was not anticipated, that the British Association did not hold its meeting in Sheffield.*

Mr. EKIN said the present meeting had been eminently successful, in fact he did not remember any occasion on which the arrangements for the comfort of the members had been so thoroughly carried out. They all knew that Irish hospitality was proverbial, and they had abundantly proved the truth of the saying. He begged, therefore, most cordially to move the following resolution:—

> "That the hearty thanks of the non-resident members of the Conference be given to the Irish members, and especially to Mr. William Hayes, Messrs. Tichborne, Draper, Hodgson, and Boyd, and the other members of the Irish Committee, for their kind and successful efforts in organizing the present meeting."

Mr. FRAZER, in seconding the motion, said they thought they had done pretty well in Scotland, but he must confess that in some respects they had been outdone by their Irish friends.

After a few words in support by Professor Attfield, the resolution was carried unanimously.

Mr. HAYES, in responding on behalf of himself and the local committee, said it had given them infinite pleasure to receive the Conference, and although it might be a long time before their visit was repeated, he hoped the time might come when they would again have that gratification.

Mr. DRAPER proposed that the best thanks of the meeting be given to Mr. Schacht for the able manner in which he had conducted the business of the present Conference.

Professor QUINLAN had much pleasure in seconding the motion. He had not previously the pleasure of Mr. Schacht's personal acquaintance, but he had long known him by reputation, and by several admirable preparations he had introduced. Some of them it had been his duty as teacher of materia medica to explain to his class, and as a practising physician to use with advantage. The skill, judgment, and urbanity with which Mr. Schacht had conducted the proceedings augured well for their meeting next year. Besides the scientific merit of the papers which were read, he thought these meetings did

* The meeting for 1879 will be held in Sheffield, on Tuesday and Wednesday, August 19th and 20th —ED. TRANS. BRIT. PHARM. CONF.

a great deal of good, for the more they brought Englishmen, Irishmen, and Scotchmen together, the better. They would all find that some of the prejudices these countries had on all sides entertained towards each other were groundless, and he hoped the day would not be distant when the Conference would meet in Dublin again.

The resolution was put by Mr. GROVES, and carried unanimously.

The PRESIDENT having acknowledged the compliment, said there was one resolution which ought to have come first, and which he would take the opportunity of moving. They were all much gratified by having had the use of such a fine suite of rooms to meet in, and he would therefore propose—

> "That the best thanks of the Conference be given to the King's and Queen's College of Physicians of Ireland for their kindness in placing at our service their elegant and convenient suite of rooms."

The resolution was carried by acclamation, and the proceedings of the Conference terminated.

THE EXCURSION AND BANQUET.

The day following the meetings of the Conference, the members, together with their friends—ladies and gentlemen—were escorted by the Irish Committee on an excursion embracing some of the beautiful vale and mountain scenery of the county of Wicklow.

The party left Dublin early by special train, and travelled *via* Bray and the town of Wicklow to Rathnew. The route to Rathnew was chiefly along the sea-shore, with fine views of the Dublin and Wicklow mountains. At Rathnew cars were waiting, which conveyed the company to the entrance of the Devil's Glen. This glen, which is one of the gems of Wicklow, was traversed on foot. Some of the party obtained better views of its wild and picturesque scenery—and also of the sea and neighbouring country—by the ascent of a height bordering on the glen. Afterwards the cars were retaken, and the company drove to Glendalough. There, in a hotel garden, adjoining the ancient remains known as the Seven Churches, luncheon was served, after which the party visited the churches and the sombre valley of the two lakes. Returning to the hotel, the cars took the party through the beautiful "Vale of Clara" to Rathdrum, whence the special train conveyed them back to Dublin.

Immediately on arrival the company repaired to the Exhibition Palace, where they were entertained at a sumptuous banquet.

Professor Tichborne, who occupied the chair, gave the usual loyal toasts, and afterwards proposed "The British Pharmaceutical Conference," to which the president responded. He alluded to the social as well as the scientific work of the Conference, and expressed his appreciation of the hearty good feeling which he had met with from the moment when he first set his foot on the shore of Ireland to that hour.

Professor Attfield proposed "The Irish Committee," praising the daily efforts made for the entertainment of the members and for the support of the Conference, and especially mentioned Mr. Hayes and Mr. Draper. He alluded to the charming excursion, which had given so much pleasure to all, and to the banquet. Mr. Draper gracefully threw all merit on to the shoulders of his colleague. Mr. Hayes, who was much applauded, expressed in glowing terms the gratification of himself and the other members of the Irish Committee at the success which had apparently attended their labours.

Mr. Schacht proposed "The Irish Pharmaceutical Society," and Professor Tichborne, Mr. Pring, and Mr. Holmes responded. Mr. Savage proposed "The Medical Corporations of Ireland," to which Dr. Gordon, Dr. Macnamara, and Dr. Collins replied. Mr. J. G. Boileau gave "The Pharmaceutical Society of Great Britain," coupling with it the name of the President, Mr. Williams. The "Associations and Schools of Pharmacy" of the United States was acknowledged by Professor Markoe. "The ladies" were toasted by the Chairman, and replied for by Professor Cameron; and Dr. Whittaker proposed "The Press," which was acknowledged by Dr. Jacob, the editor of the *Medical Press and Circular*, and Mr. Scott.

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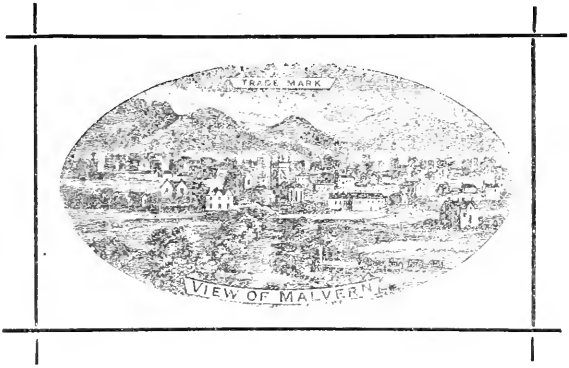

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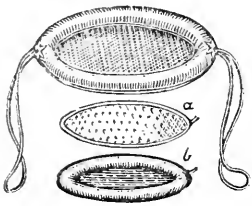
,,	Shilling size, in Boxes, with extra Brushes, White Flint Glass ... ... per doz.	0	7	0

Fig. 2.



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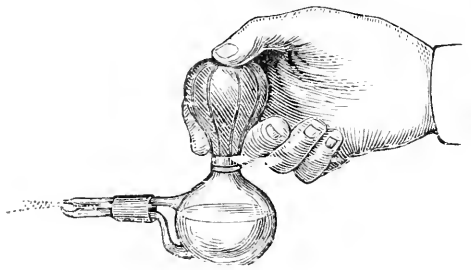
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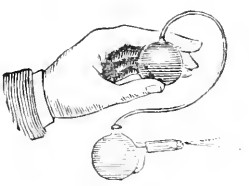
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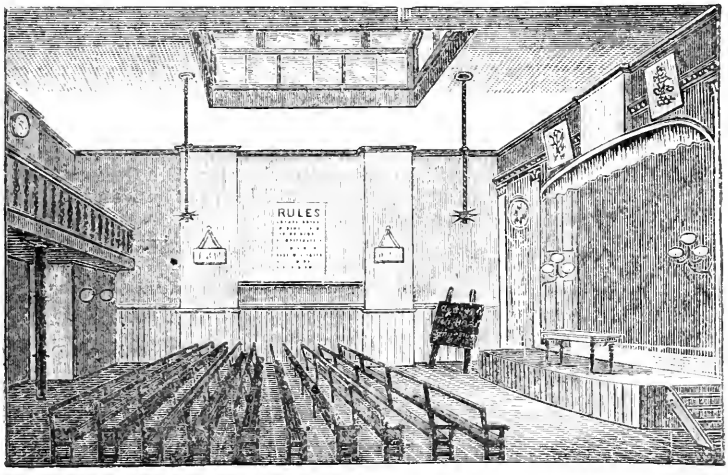

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IMPORTANT CAUTIONS

From Lord Chancellor SELBORNE, Vice-Chancellor Sir W. PAGE WOOD, and the Lords Justices of Appeal.

VICE-CHANCELLOR SIR W. PAGE WOOD, by whom the suit in Chancery was first heard, stated in his judgment that "Dr. J. Collis Browne was undoubtedly the Inventor of Chlorodyne, that the whole story of the defendant Freeman was as deliberately untrue as the falsehood he had deposed to with reference to the use of his Chlorodyne in the hospital."

THE VICE-CHANCELLOR also stated "that Chlorodyne was a fanciful name, and had application been made sooner, the Court would have given Dr. Browne protection."

LORD CHANCELLOR SELBORNE coincided with the judgment of the Vice-Chancellor upon this point, and stated "that had application been made at a proper time and place, the Court would have found means to restrain the Defendant from misrepresenting the decision of the Vice-Chancellor."

LORD JUSTICE JAMES, on appeal, stated in his judgment, "that the Defendant Freeman had made a deliberate misrepresentation of the decision of Vice-Chancellor Wood."

It was proved in court, on affidavit by Mrs. Forbes, of Paris, that the testimonial published in the "Times," November 14th, 1865, speaking of the great efficacy of Chlorodyne in Cholera, referred to Dr. J. Collis Browne's Chlorodyne, and that she never used any other, that she had written to the Defendant Freeman to that effect; notwithstanding which notice the Defendant publishes the said testimonial as referring to his medicine.

The Editor of the "Medical Times and Gazette," in his report on Chlorodyne, January 13th, 1866, gives information that the Chlorodyne referred to was the medicine introduced by a retired Army Medical Officer, which was Dr. J. Collis Browne. Still this is published by the Defendant as testimony to his medicine.

Numerous affidavits from eminent Physicians and others were produced in Court, stating that Dr. J. Collis Browne was the inventor of Chlorodyne, and that when prescribing they mean no other.

The Defendant himself publishes that his compound is in effect and composition quite different to any other preparation; nevertheless he assumes the name, testimonials, etc., of Chlorodyne.

The following eminent firms stated on affidavit that Dr. J. Collis Browne was the discoverer of Chlorodyne, and that they always supplied the preparation as the Original Chlorodyne, or when Chlorodyne was asked for—

THE APOTHECARIES' HALL, LONDON.	Messrs. Cox & Gould.
Messrs. Allen & Hanbury.	,, Corbyn & Co.
,, John Bell & Co.	,, Evans & Lescher.
,, Baron & Harvey.	,, Morson & Son.
,, Burgoyne & Burbidge.	,, Savory & Moore.

Sold in Bottles—1*s.* 1½*d.*, 2*s.* 9*d.*, 4*s.* 6*d.*, *and* 11*s.* *Usual Discount to the Profession.*

SOLE MANUFACTURER,

J. T. DAVENPORT, Pharmaceutist,

33, GREAT RUSSELL STREET, BLOOMSBURY SQUARE, LONDON.

WILLIAM MATHER,

WHOLESALE AND EXPORT DRUGGISTS' SUNDRIESMAN,

Manufacturer of Court Plaister, Goldbeaters' Skin, and Surgical Plaisters,
Surgical Instruments, and Medical Glass.

T E WANT OF A CENTURY SUPPLIED.

RETAIL.

In Bottles.

6d.

1/-

2/6

5/-

each.

MATHER'S NIGRINE
A JET BLACK MARKING FLUID
FOR MARKING LINEN, COTTON, &c.

WHOLESALE.

Per dozen.

3/6

7/-

18/-

36/-

Subject to usual discount.

HONOURABLE MENTION, PARIS EXHIBITION, 1878.

No Preparation or Heating required after being Written.

All Articles marked with MATHER'S NIGRINE will stand Boiling in the following Solutions, whereas Marking Inks made with Silver will not, viz.:—

Solution Cyanide of Potassium | Solution Caustic Potash. | Solution Caustic Soda. | Chloride of Lime or Bleaching Powder.

The following advantages are gained by using Mather's Nigrine:—

1st.—**NO WARM IRON or HEATING required.**
2nd.—**NO PREPARATION, MIXING, or WASTE.**
3rd.—**NO fear of SCORCHING or BURNING the cloth.**
4th.—**Can be used with a STEEL or QUILL Pen, BLOCKS, or STENCIL PLATE, for Monograms.**
5th.—**The BOTTLES contain DOUBLE the QUANTITY of ordinary Marking Ink.**
6th.—**Becomes, when washed, a JET BLACK, which gets DARKER with repeated washing and age.**
7th.—**Cannot be removed by ANY CHEMICAL MEANS.**
8th.—**Will not Injure the most delicate Fabric.**
9th.—**Flows readily from the Pen.**

Ladies will find an interesting and agreeable occupation in using MATHER'S NIGRINE for Etching Fern Leaves, Rustic Scenery, Views, etc., on cloth, which may be used for Dessert Doyleys, Antimacassars, Toilet Mats, and sundry other Ornamental and Useful Work, as from the finer lines remaining distinct after repeated washing, very satisfactory results may be obtained from this fluid, which is not the case with any other Marking Ink.

NIGRINE: A Jet-Black Marking Fluid (WM. MATHER, Farringdon Road, London).—"We can recommend this as a very good and convenient Marking Ink. We have submitted Linen marked with it to some of the most powerful of Chemical Agents, including Acids, Alkalies, and Chlorine, and Cyanide of Potassium, and have found that it was very much easier to destroy the Linen than the marking upon it; in fact, the writing could not be effaced by any of the agents we employed."—Extract from the *Lancet*, Jan. 5th, 1878.

Liberal Discount to Large Buyers.

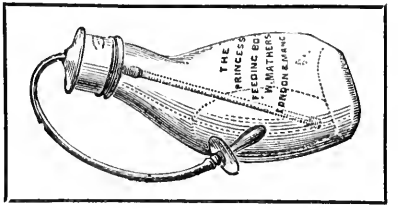
"The Princess."

MATHER'S LATEST IMPROVED

THE "PRINCESS,"

With Porcelain Fittings, 7s. per doz.

With Boxwood Top Corks, 3s. 6d. per doz.



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With Pure Tin Screw Cap and Patent Valve, 12s. per doz.

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MATHER'S Cough Lozenges.
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MATHER'S Chest Protectors.
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MATHER'S Sponge Bags.
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N.B.—On the 1st of March, 1st of June, 1st of September, and 1st of December in each year, is published MATHER'S QUARTERLY PRICES CURRENT, comprising Druggists' Sundries, Medical Glass Ware, Perfumery, Surgical Plaisters, &c., &c. Wholesale Houses wishing to receive it in due course are respectfully requested to forward their names and addresses to Publishing Department, FARRINGDON ROAD, LONDON, E.C., when they will be placed on the Register for regular transmission.

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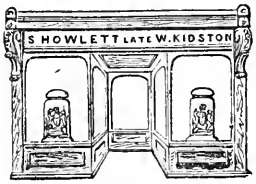

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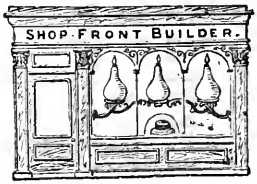
Established 1830.



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A few minutes' ride by Omnibus from the Bank.

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Cabinet Fitter to the Pharmaceutical Society of Great Britain. Manufacturer of every description of Air-tight Glass Show-Cases for Chemists, Jewellers, etc. Medical Labelling, etc. Plans and Estimates for Entire Fittings and Alterations supplied.

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PRIZE MEDALS—LONDON, 1862; PARIS, 1875; PHILADELPHIA, 1876; PARIS, 1878.

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The ST. CLEMENT'S GLASS Co. (Limited),

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Will send their List of Prices on Application.

Shippers, Wholesale Houses, and Bottlers of Proprietary Articles should apply at once if they are in search of a first-class article at a low price.

Manufactory and Chief Offices—

CLEMENTHORPE, YORK.

6d. Inks, 30s. per gross; 1s. Inks, 60s. per gross.

Great Reduction in prices, Pedestals and Glass Boxes included 20 off £100 orders; 10 off £50.

Another Medal, Paris International Exhibition, 1878, 2nd award, Hon. Mention, French and

Fac-Simile of 6d. and 1s. Labels.

English President and Jurors; and 2nd Gold Medal Academie, Paris, 1878, for Merit and Superiority of Product.

CAUTION.—BOND'S MARKING INK (Crystal Palace).—Wholesale and Retail Dealers are hereby WARNED that LEGAL PROCEEDINGS are now PENDING against the MANUFACTURER of a MARKING INK, which is being Sold with colourable imitations of the Trade Marks of the Manufacturer of the above Ink, and that similar proceedings will be taken against all other persons selling the same. The genuine label has the words, "Prepared by the Daughter of the late John Bond, 75, Southgate Road, London, N." Trade Marks are not only symbols, but those characteristics and general appearances to mislead the public. See action, tried Court of Common Pleas. Jan. 15 and 16, 1876.—Wills and Watts, 53, Charter Lane, Doctor's Commons, Solicitors to the Proprietor; J. P. Yeatman, Esq., barrister-at-law, Standing Counsel.

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No. 1 case, Desk shape, containing ½ doz 1s. Crystal Palace Pedestals, with Ink, Pens, and Linen Stretcher; 1 doz. 1s. Crystal Palace and Royal Indelible in Blue Wrappers and Black and White Oval Label; 3 doz. 6d. do. do. ... 18s. 9d.

No. 2 case, containing 3 doz. 1s. Crystal Palace and Royal Indelible, Blue Wrapper, Black and White Oval Label, old style ... ... 16s.

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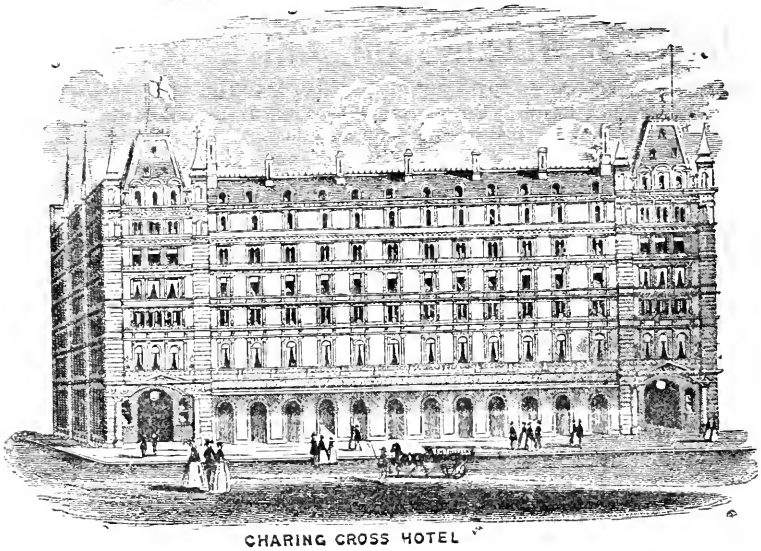
AWARDED PHILADELPHIA EXHIBITION.



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GOLD MEDAL, PARIS, 1867.

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E. H. THIELLAY'S

EAU FONTAINE DE JOUVENCE, GOLDEN;

Or GOLDEN HAIR FLUID,

For rapidly changing Dark Hair into Flaxen or Sunny Shades.

Wholesale at	20/-	30/-	40/-	54/-	80/-	96/-	per dozen.
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A very Remunerative Article.

ALSO

EAU FONTAINE DE JOUVENCE IN EVERY SHADE.

Auburn.	Brown.	Restorer.
Dark.	Black.	Progressive.

WHOLESALE DESCRIPTIVE PRICE LIST ON APPLICATION.

EUCALYPTIA.	SHIPBOURNE.	COMPANION.
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Shippers and Merchants supplied on the usual Terms, and at a considerable reduction for export in Bond.

EAU DE COLOGNE

OF THE

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MARIA CLEMENTINE MARTIN, opposite the Cathedral, Cologne.

EXTRACT FROM OFFICIAL REPORT OF THE EXHIBITION. PART III., SERIES 30, CL. 29:—

"The samples of Eau de Cologne sent to the Exhibition by MARIA CLEMENTINE MARTIN, Nun, of Cologne, were unanimously acknowledged by the Jury to be the best. This precious liquid seemed to contain all the different scents, whilst on evaporating it, none of them became particularly recognisable. Martin's Eau de Cologne, which was rewarded with a prize Medal, in general served as means of comparing and judging the other perfumes."

PRIZE MEDALS.—London, 1851 and 1852; Rhenish Provinces, 1852; New York, 1853; Vienna, 1873; Paris, 1855; London, 1862.

SOLE AGENT FOR THE UNITED KINGDOM:—

ARTHUR I. JOSEPH, St. Leonard's-on-Sea.

PRICE LIST.

	Duty paid, net.	In bond.
2-oz. shorts, Eau de Cologne	8/-	5/-
4-oz. ,, ...	15/-	10/-
4-oz. ,, ...	wickered 20/-	15/-
Half-pints	,, 25/-	17/3
Pints	,, 50/-	34/6
Quarts	,, 100/-	69/-

Small Cases assorted to order (of not less than £3 value in bond) delivered free freight to any port in the United Kingdom, less 7½ per cent. discount. May be obtained on these terms of any Wholesale House, or at the London Depôt:—

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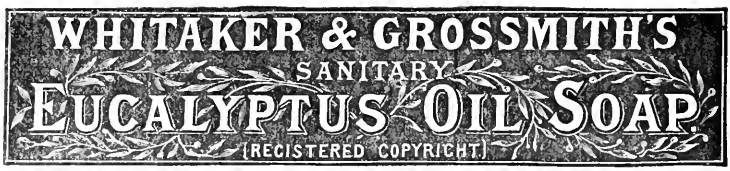

Combining with Toilet Soap the sanitary properties of the EUCALYPTUS GLOBULUS, to purify and refresh the Skin, with an aromatic disinfectant for the Apartment.

In 1/6 Boxes of 3 Tablets, 12/- per dozen Boxes.

Extract from "THE LANCET."—"The now well-known odour of the *Eucalyptus Globulus* is perceived as soon as a cake of this Soap is taken in hand. The oil contained in the leaves of the plant is highly aromatic, very pleasant, and considered to possess *sanitary* properties. This Soap is well adapted for Toilet use, and is an elegant preparation."

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REGISTERED INVENTORS AND COPYRIGHT MAKERS,

WHITAKER & GROSSMITH, Toilet Soap Makers and Perfumers,

120, FORE STREET, CITY, LONDON.

Manufacturers of the Pure White Glycerine Soap.

DINNEFORD & CO. (The Original Patentees)

Beg to announce that they have resumed the Manufacture, on their own Premises and with improved Machinery, of

Horse-Hair Friction Gloves, Belts, Bath Brushes, Oxford and Cambridge Pads, &c., &c.

In white, grey, and black hair, of various degrees of hardness, to suit the most delicate, without risk of injury to the skin.

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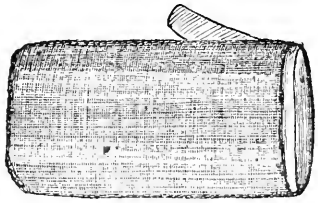

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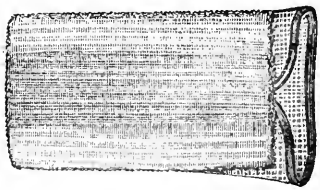
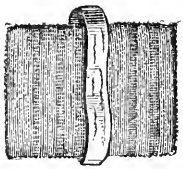
No. 1 size, 36*s.*; No. 2, 40*s.*; No. 3, 42*s.* per doz. pairs. Retail, 5*s.*



PRINCE OF WALES BATH GLOVE.

For wet or dry use. 21*s.* per doz. Retail, 2*s.* 6*d.* each.



CLARENDON FLESH RUBBER.

Hair on both sides. One surface is soft, the other hard; either may be used for friction. 24*s.* per doz. Retail, 3*s.* 6*d.* each.

ARMY BATH PAD.

For wet or dry use. Hair on both sides. A luxury for the Bath. 12*s.* per doz. Retail, 2*s.* each.

OXFORD WASHING PAD.

For cleaning and softening the hands, and for the bath. In 1 doz. boxes; 8*s.* per doz. Retail, 1*s.* each.

ALEXANDRA BATH BRUSH.

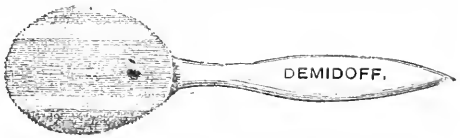
Hair on both sides, on a long handle. 24*s.* per doz. Retail, 2*s.* 6*d.* each.

CAMBRIDGE PAD.

Hair on both sides; for softening the hands and for the bath, 12*s.* per doz. Retail, 1*s.* 6*d.* each.

THE DEMIDOFF.

42*s.* per doz. Retail, 5*s.* each.



FLESH STRAP OR BELT, AND BATH STRAP.

Ladies' quality, light hair and soft pile. Gents' quality, black or grey, and pile of various degrees of hardness. 42*s.* per doz. Retail, 5*s.* each.

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ANTI-DYSPEPTIC COCOA OR CHOCOLATE POWDER.

GUARANTEED PURE SOLUBLE COCOA of the Finest Quality, without Sugar or any Admixture.

Cocoatina is the highest class of Soluble Cocoa or Chocolate, with the excess of Fat extracted Mechanically.

Being all Cocoa it is four times the strength of preparations thickened yet weakened with arrowroot, starch, etc., and in reality cheaper. Made instantaneously with boiling water, a teaspoonful to a breakfast cup, **costing less than a halfpenny.**

The FACULTY pronounce it "the most nutritious, perfectly digestible beverage" for BREAKFAST, LUNCHEON, or SUPPER, and invaluable for Invalids and Children.

It keeps in all climates, and is palatable without milk.

COCOATINA FLAVOURED WITH VANILLA is the most delicate, digestible, cheapest Vanilla Chocolate, and may be taken when richer Chocolate is prohibited.

In air-tight tin Canisters at 1*s.* 6*d.*, 3*s.*, 5*s.* 6*d.*, etc., by Chemists and Grocers.

H. SCHWEITZER & Co., 10, Adam Street, Adelphi, London, W.C.

AND ALL WHOLESALE HOUSES.

Brand & Company (Estd. 1835.)

No. 11, Little Stanhope Street, Mayfair, London, W. (top of Down Street, Piccadilly),

Beg respectfully to call the attention of the Trade to their

SPECIALTIES FOR INVALIDS.

CONSISTING OF

CONCENTRATED BEEF TEA, MUTTON AND CHICKEN BROTHS, etc.
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TURTLE SOUP AND JELLY, AND CALF'S FOOT JELLY (prepared expressly for invalids).
SAVOURY MEAT LOZENGES.

Extract from the "British Medical Journal," 21st and 28th November, 1874.—"The preparations manufactured by Messrs. BRAND & Co., of No. 11, Little Stanhope Street, Mayfair, London, and known as 'CONCENTRATED BEEF TEA' and 'ESSENCE OF BEEF' respectively, are already largely used by leading medical practitioners in the metropolis. The first is for ordinary use, the second is more especially suited for very delicate stomachs and for invalids. They are prepared with great care from English meat of good quality, and in delicacy of flavour, the fluid extract (Essence of Beef) is well-known by London physicians to be a preparation on which they can entirely rely. Hence the favour which it has met, and our reason for mentioning now with approval the samples submitted to us."

Caution.—Beware of Imitations.

Each Tin or Skin manufactured by B. & Co. bears their Signature and Address as above on the Label, without which NONE are genuine.

Sold by all Chemists and Druggists.

CHEMISTS and OTHERS

WHO CONTEMPLATE

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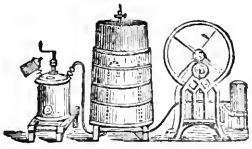
SHOULD SEND FOR THE

Illustrated Catalogue of Machinery,

FORWARDED FREE.

There are over 1000 Manufacturers in the United Kingdom using these Machines for making

Soda, Potass, Seltzer, Carrara, Lithia, Magnesia, and Tonic Waters, etc. ;



Lemonade, Ginger Beer, Ginger Ale, Orangeade, Gingerade, Nectar, and Champagne Cider.

Directions and Recipes for the Manufacture of all Aerated Drinks given to purchasers of Machines, etc.

MACHINES FROM £30 TO £200.

PRIZE MEDALS:
London, 1862, 1873, 1874, Paris, Vienna, Philadelphia, Cape, and Paris, 1878.

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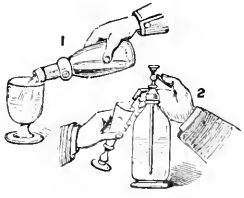
CODD'S PATENT SODA-WATER BOTTLE.

Over 500 Mineral Water Makers are now using these Bottles in the United Kingdom.

No. 1. CODD'S PATENT GLOBE STOPPERED SODA-WATER BOTTLE, entirely dispensing with corks, wire, string, and skilled labour in filling. Easily filled and easily opened. Samples sent packed in case for 1*s.* 6*d.*



No. 2. THE LONDON-MADE SYPHON BOTTLE, handsomer in appearance and simpler in its action than any yet introduced. Sample packed and sent for 2*s.* 6*d.* Quart size, 2*s.* each, in quantities.

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SYPHON BOTTLE.

BARNETT, SON & FOSTER,

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SODA-WATER MACHINERY

IN ALL ITS BRANCHES.

Over 2,000 in use of the Continuous Process Machines.

Awarded at Paris, 1878, GOLD MEDAL.

Engines,
Boilers,
Washing Troughs,
Rinsers,
Generators,
Cylinders,
Syphons,
Bottles,
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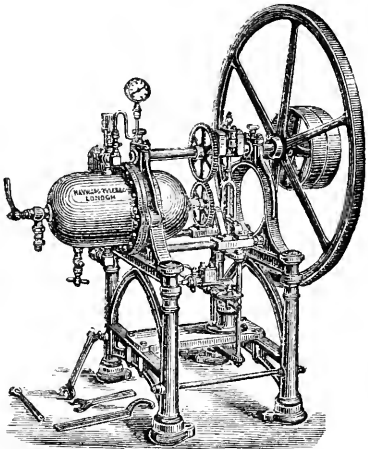
Taps, etc.



Strong Continuous Process Soda-Water Machine, with 2½-inch Pump and extra large Cylinder.

Bottling Machines,
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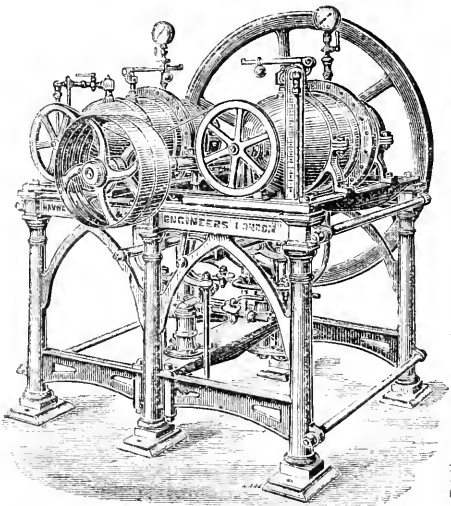

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NAME.	PROPERTIES.	TRADE PRICES. Per Dozen. Qts.	Per Dozen. Pts.	Per Orig. Pkg. Qts.	Per Orig. Pkg. Pts.
Adelheidsquelle	Iodized	12/	...	48	...
Aix-la-Chapelle	Sulphurous	16/	10	70	44/
*Apollinaris (Glass)	Acidulated, Gaseous	6/3	5/	23	*36
Do. (Stone)	Do.	6/3	5	22	17 6
5% discount on orders for 20 hampers.					
Bareges	Sulphurous	12/	9	48	36/
Bilin	Alkaline, Acidulous	9	...	36	...
Birmenstorf	Alkaline	12/	...	44	...
Bonnes	Sulphurous	12/	9	48	35/
Bourboule, La	Arsenical	11/	...	42	...
Bussang	Alkaline	7/	...	28	...
Carlsbad	Do. & Purgative	9 6	...	38 6	...
Condillac	Do.	6	...	25	...
Contrexeville	Do.	10/	...	36	...
Ems	Do.	8/	...	30	...
Fachingen	Acidulated, Gaseous	6	4	23	16/
*Friedrichshall	Saline, Aperient	11/	7 6	*26/	*35
Giesshubler	Alkaline, Ferruginous	11	8	21	29
*Harrogate	Sulphurous	7	...	*20	...
Homburg	Saline, Gaseous	10/	...	40/	...
*Hunyadi-Janos	Do. Aperient	16 6	13 6	*30	50
Kissingen	Alkaline, Gaseous	11 6	...	45	...
*Kreuznach	Iodized	11/	...	*26	...
Marienbad	Alkaline, Purgative	10	...	40	...
*Mi-si-quoi	No Analysis given	25/	...	*50	...
*Orezza	Ferruginous	12	...	*28	...
Pougues	Alkaline	9	...	36	...
*Pullna	Saline, Purgative	12/	8 6	*36	*25
Pyrmont	Ferruginous	14/	...	52	...
Roisdorf	Acidulated, Gaseous	5 6	...	21	...
Royat	Alkaline	9	...	34	...
Saint Galmier	Acidulated, Gaseous	5 6	...	21	...
*Saint Moritz	Ferruginous	13	...	*32	...
Saratoga	Alkaline, Gaseous	...	12	...	47
Schwalbach	Ferruginous	8	6	30	24
Schwalheim	Acidulated, Gaseous	7	...	28	...
Selters	Do. Do.	6/	4	22	15 6
Spa	Ferruginous	9	...	36	...
Tarasp	Alkaline, Saline	12/	...	48	...
Vals	Do. Gaseous, &c.	8 6	...	32	...
Vichy (de l'Etat)	Do. Do.	8 6	7 6	31	27
Do. (Sundry)	Do. Do.	7 6	6 6	25	23
Wildungen	Alkaline	11/	...	43	...
*Woodhall	Iodized	7/3	5	*20/	*26/

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